

111929





PROCEEDINGS  
OF THE  
ARISTOTELIAN SOCIETY.

NEW SERIES.—VOL. XXI.

*Containing the Papers read before the Society during the  
Forty-second Session, 1920-1921.*



PUBLISHED BY  
WILLIAMS AND NORGATE,  
14, HENRIETTA STREET, COVENT GARDEN, LONDON, W.C. 2.

1921.

*Price Twenty-five Shillings nett.*





# CONTENTS.

	PAGE
I.—IS THE TIME SERIES REVERSIBLE? THE PRESIDENTIAL ADDRESS. By W. R. INGE ... ..	1
II.—VARIATION, HEREDITY AND CONSCIOUSNESS. By W. P. MONTAGUE ... ..	13
III.—THE NEW MATERIALISM. By C. A. RICHARDSON ...	51
IV.—A PLEA FOR A PHENOMENOLOGY OF MEANING. By R. F. A. HOERNLÉ .. ...	71
V.—COSMIC EVOLUTION. By J. E. BOODIN ... ..	91
VI.—SYMPOSIUM: THE CHARACTER OF COGNITIVE ACTS.	
I. By JOHN LAIRD ... ..	123
II. By G. E. MOORE ... ..	132
III. By C. D. BROAD ... ..	140
IV. By G. DAWES HICKS ... ..	151
VII.—ON PROFESSOR DRIESCH'S ATTEMPT TO COMBINE A PHILOSOPHY OF LIFE AND A PHILOSOPHY OF KNOWLEDGE. By HILDA D. OAKELEY ... ..	161
VIII.—ON THE STRUCTURE OF SCIENTIFIC INQUIRY. By DOROTHY WRINCH ... ..	181
IX.—ON ARGUING IN A CIRCLE. By F. C. S. SCHILLER ...	211

---

ABSTRACT OF THE MINUTES OF THE PROCEEDINGS FOR THE FORTY-SECOND SESSION ... ..	235
LIST OF OFFICERS AND MEMBERS FOR THE FORTY-THIRD SESSION.	238

## ERRATA.

Page 16, line 1, *for* "and one" *read* "and not one."

Page 16, line 2, *delete* "not."

Page 18, line 14 from bottom, *for* "et" *read* "or."

Page 23, line 15, *for* "west" *read* "north."

Page 27, line 11, *for* "excessive" *read* "successive."

Page 34, line 6 from bottom, *for* "stress-symptoms" *read* "stress-systems."

Page 46, line 14, *for* "efferent" *read* "afferent."

# PAPERS READ BEFORE THE SOCIETY.

1920-1921.

*Meeting at the Conference Hall of the University of London Club,  
21, Gower Street, W.C. 1, on November 8th, 1920, at 8 p.m.*

## I.—THE PRESIDENTIAL ADDRESS: "IS THE TIME SERIES REVERSIBLE?"

*By W. R. INGE.*

YOU have thought fit, my kind friends, to elect as your President a mere man of letters, an untrained philosopher, who is quite unfit to hold the exalted position in which you have put him. You must, therefore, be prepared for an inaugural address which may be irritating or amusing, according to the state of your tempers, but which I cannot hope to make instructive to an audience of experts. I can only do my best, and assure you that the superficiality of my arguments is due to my natural limitations, and not to any want of respect for the formidable critics who have paid me so undeserved a compliment.

If the members of the Aristotelian Society are ever frivolous enough to visit an exhibition of moving pictures, in order to unbend their great minds, they may have seen a reversed film thrown on the sheet. For example, they may have been introduced to a public bath, the water of which was at first untroubled, and the bath apparently empty. Then a splash disturbs the calm, followed by the emergence of a pair of feet, the prelude to the apparition of a human body describing a graceful upward curve, till a bather with uplifted arms stands on the margin of the pool in the attitude of one preparing to dive. It is possible, after witnessing such an exhibition, to imagine ourselves living in a reversed Time-Order, in which

case we should soon begin to think of the splash as the cause, not the consequence, of the header. Is there anything in the nature of things to forbid the possibility of such a return journey through Time—I do not say for us, who are obviously condemned to travel in one direction only, but for any sentient being? Are we justified in saying that the Time Series is necessarily and absolutely irreversible?

Positions in Time are distinguished in two ways, as earlier or later, and as past or future. The position of earlier and later is, in our experience, permanent, the position of past and future is not. Past and future are divided by a line, an Euclidean line as I shall presently argue, which we call the present; and this line is in constant movement. It is possible that the former distinction may be real, the latter unreal. In this case the time succession would be real, but an observer who was not blind on one side would see it all, as a stationary spectator sees a moving object while it remains within the field of his vision. It is also possible that both may be unreal, and that the order which we see as earlier and later may be a true but reversible order. The colours in the spectrum always appear in the same order; but we are free to let our eyes travel from red to violet, or from violet to red. The order of the colours is real, but not successive; and when we mentally prolong the series in both directions, we are using neither memory nor anticipation. In this case the illusion of earlier and later must be part of the same illusion which gives us past and future. Thirdly, it is theoretically possible that the order itself may be an illusion, so that the series ABCD might equally well be read BADC. But as such an hypothesis would reduce the world to chaos, it is not worth discussing.

If the positions of earlier and later, and of past and future, belong to appearance and not to reality, the real order will be a series, but a series without change and without time. The Time Series will be a mode of appearance of a series which may be really logical or teleological. The real world may be a congeries

of articulated systems, each of which, taken as a whole, has a meaning to which every part in the system contributes equally. If this is so, Time and Space will be the warp and woof of the canvas on which the world of appearance is spread out, and the dimension of Time must be co-ordinated with the dimension or dimensions of space, as I believe Einstein proposes to do.

Is there any objection to thinking that what we call past and future are merely parts of our "elsewhere"? We do not suppose, as we travel to Scotland, that Carlisle must pass out of existence before Carstairs can become real; we know that before long, when we are returning to our duties, we shall pass these stations in the reverse order. Similarly, the year 1900 and the year 1930 may be equally real, each holding its fixed position in an unchangeable series. We happen to be moving away from 1900 and towards 1930, just as the earth happens to revolve in one direction and not in the other. I suppose that no explanation is available of the direction of the earth round the sun, or of the moon round the earth, a direction which is reversed in the motion of certain satellites, or of the linear motion of the whole solar system. We cannot, therefore, expect to explain why we are moving forwards and not backwards through time.

Since, however, our consciousness does seem to affirm the distinction of past and future, are there any reasons for thinking that this distinction is illusory? I will dismiss one argument on this side which seems to me to be fallacious. It might be suggested that as past and future are incompatible terms which may both be predicated of any event, they cannot be true. But I think this is a fallacy. They are not incompatible unless they are not only predicated of the same event but referred to the same present. They are of the nature of judgments by which we explain experiences which would otherwise be self-contradictory.

The real objection to past and future is the objection to the not yet and no longer which the words imply. When we use the words past and future, we mean to assert that certain

events have passed out of existence, and that other events have not yet come into existence. The only events which exist now, we mean to say, are present events. But there are no present events. Perception is always of the past, and may be simultaneously of different pasts. I go into the garden on a summer night. I perceive the tickling of a midge-bite a second ago, and slap my face just too late to be revenged on the insect. I hear a church clock which struck two seconds ago in the valley. I see the twinkling of a star which emitted that particular ray in the seventeenth century. Objective time, if there is such a thing, is in two dimensions only: the present is a point which has no dimensions, or a line which has no breadth. Psychologists have attempted to overcome this difficulty by speaking of a specious present, which has some, and not always the same duration. But the present through which events pass is not the same as the specious present. Everything is observed in a specious present, but nothing can *be* in a specious present. In our representation, past and present, or rather a series of pasts ending in the present, are comprehended in one synchronous intuition, and as a succession; but our representation is not itself successive. When we remember a series of events, that is to say, represent it to our consciousness, we keep it's order, but we fix it, taking it out of the time-stream. We turn it from a temporal into a logical or teleological series. We know too that memory is never infallible, and that, whether consciously or unconsciously, we contaminate it with later experience. The past which we think of as affecting the present is often a past which never existed. We also test our memory by reason, rejecting, for example, our memory of dreams, because they are isolated and discordant with earlier and later experience. When we say that an event is present, not past, all we mean is that it comes before us as something perceived, not remembered; and, I think I may add, as something unfinished. But it may be doubted whether we ever have perception without memory; we certainly could not have a specious present.

without memory, and probably not without anticipation. Is there more than a difference of degree between my grasp of the first words of a sentence which is being spoken, and my memory of a remark which my friend made ten minutes ago? I regard the unfinished sentence as present because anticipation has a part in it as well as memory. In fact, I call it present because it is partly future and partly past; but I call the earlier part of the sentence present only if it is part of a logical, not a temporal, sequence. If my friend sneezed near the beginning of his argument, the sneeze is not part of my specious present; it has become a portion and parcel of the dreadful past; the beginning of the argument, which in time preceded the sneeze, is part of my specious present, if my friend seems to me to have been talking rationally, and if he is still talking. I think therefore that we may dismiss the present, as a dimension of Time, altogether.

How does this rejection of the present as a dimension affect the well-known doctrine of the mystics, who, while denying the reality of Time, hold that God lives in an "Eternal Now"? The doctrine is that the specious present of an omniscient Being extends in both directions to infinity, so that God always speaks in the present tense. But, in my opinion, this statement that God lives in an Eternal Now does no more than negate the unreality of the past and future. It seems to mean only that reality is a coherent system which may be viewed indifferently from any point within it. Or, and this is nearer the thought of the mystics, it means that the consciousness of God is always immediate. He does not remember or anticipate; He sees. Perhaps we may define what we call the Present as the content of immediate consciousness. But such a content has no temporal existence; we have taken an event out of the Time-stream when we suppose it to be intuited immediately. Nor can we escape by supposing that all real content persists unchanged through endless time. The consciousness which saw things thus would be in Time, but



would not know it. And this notion of a petrified universe is really open to the charge of confounding Time with Space. It is an attempt to preserve Time, while denying one of the essential attributes of the Time-experience, namely, change. It would give us a world like a photographic plate on which a whole series of photographs had been taken one on the top of another.

I suggest that our consciousness of the Present is our point of contact with supra-temporal existence, and that our tendency to identify this experience with the moving line which divides past from future is an error. Immediacy belongs only to a supra-temporal mode of intuition; and it is worth remembering that the mystical intuition is generally of objects which have little or no relation to Time, such as the Divine attributes or the Platonic ideas.

But it may be said, a fact is a rational whole consisting of a series of events linked together as cause and effect; and cause and effect are not reversible. This objection involves us in an investigation of the conception of cause. The conception of cause, in the ordinary sense, undoubtedly involves the idea of temporal succession; the cause must always precede the effect in Time. But the common conception of cause also involves the idea of a transaction between two things, of which one is active, the other passive. This is, I believe, the idea of causation taken by Locke and Hume. Further, if one fact causes another, there must be discontinuity; reality must be an assemblage of separate facts. The conception of force, which science has now discarded, belongs to this conception of cause. Force is efficient action exercised by one thing upon another.

Bergson's quarrel with natural science rests partly on his impression that science believes in causation in this sense. In reality, the conception of causation has been almost driven out of natural science, and perhaps it would be a good thing if it were driven out of philosophy too. Newton long ago laid down

that "action and reaction are equal and opposite," thus disposing of the "active and passive" theory. Some philosophers at the present day are prepared to make a clean sweep of the whole conception of cause. Mr. Bertrand Russell calls it a relic of a bygone age, and points out that "in astronomy the word never occurs; physics has ceased to look for causes, because there are no such things." It was the realization that events cannot be causes that led to the Cartesian doctrine that all "efficiency" belongs to God. Berkeley also thought that God is the sole cause. It is unnecessary to do more than allude to the theories of occasionalism and pre-established harmony which belong to the same type of philosophical thought. The idea of cause seems to be an anthropomorphism, an introjection of human experience into objects. It arises probably from our experience of voluntary action in ourselves.

If earlier and later are reciprocally determinate, the time process is not objectively irreversible. Cause and effect are merely our way of looking at the process because we are always moving in one and the same direction. The cinema has made it easier for us to imagine movement in the opposite direction, the direction in which the future, as it were, rushes to meet us. Our common assumption that we can act on the future, but that the future cannot act on us, seems to be a survival of the discredited theory of activity and passivity. We say that we can alter the future, but that we cannot alter the past. But what does this mean? Of course we cannot make the past other than it was, and it is equally certain that we cannot make the future other than it will be. This is a mere application of the law of contradiction. But there is no absurdity or contradiction in saying that our past would have been different if our present wishes were different. Our past as it was is, I suppose, a necessary antecedent of our present as it is, and could theoretically be inferred from it; for I cannot think that Kant was right in holding that several causes may produce the same effect; but neither, strictly speaking, determines the other. A

wish and its realization, if it is realized, form a practically independent and coherent system. In a large part of our thoughts, there is no reference to past and future. Science ascribes the same value to events at all periods. The changes which stars and planets undergo in consequence of increasing or decreasing heat, are regarded as parts of an immense cyclical movement, in which there is no qualitative change, but only, as Empedocles said, alternate coalescence and dissociation. Cosmic evolution and involution may be traced either way. Eclipses are treated in exactly the same manner, whether they are in the past or in the future; the question whether they have already occurred is irrelevant. The eclipses of the past are replaced in their proper position, and not from memory; the eclipses of the future appear in the calendar, which is not constructed by the gift of prophecy.

The real significance of the idea of cause is often obscured; there is much very loose thinking on this subject. Uniformity of sequence does not constitute a causal order. Causation implies explanation. It is part of the idea of an intelligible Ground. And the only intelligible Ground is the apprehension of an intelligible system in which a particular fact falls. The ultimate Ground of any event must be sought in all the rest of reality, future as well as past. The mere transferences of energy, which constitute what is erroneously called the causal system of nature, contain nothing by which one event could be called the Ground of another. Gravitation neither causes nor explains the fall of a stone; the fall is a particular instance of a fact which calls for explanation. Hence, Anaxagoras was led to postulate Mind as an intelligible principle of order; and it was because he did so that Plato and Aristotle compared him to a sober man among the drunken. Plato thought of the Time-process as a sort of copy or adumbration of a real order, which is rational and timeless.

I do not think that the freedom of the human will is much affected by the problem which we are discussing. Our will

in Time is part of the events themselves, not something which acts upon them. And we have found that an event in Time cannot be a cause. If we are free, the self that is free must be outside the flow of events, and itself timeless. The unit on which judgment is passed as being a free agent must be the whole self, and in considering the articulations of this unit, it does not matter which end we begin with. I am inclined to think that a false doctrine of causation has had much to do with the difficulties about determination and free-will. The argument has too often assumed that we cannot be free unless we can find some breach in the mechanically determined series of events. But a mechanically regular sequence may quite well be volitionally or teleologically determined. We have only to insist that the determining principle, in so far as it is free, is not itself part of the complex in which the process is manifested.

Nor do I think that our instinctive valuation of experience is fatal to the hypothesis that the Time Succession is illusory. We may be reminded of the proverbs, "All's well that ends well," "Respice finem," and "Call no man happy before he dies." But what we hope or dread from the future is a judgment upon our lives as unitary wholes. If a man has devoted his whole energies to the ambition of leaving behind him a large fortune, and then dies a bankrupt, we judge that his life has been a failure. But if his ambitions have had nothing to do with money, his biographer does not even mention the amount at which his will was proved, though if he is an American he will probably mention the number of pounds which his wife weighed. We do not consider St. Paul a failure because he was beheaded, or Abraham Lincoln because he was assassinated. The Stoics were right, I think, in denying that a continuance of success once achieved should affect our estimate of a man's career. Once again, it is a logical or rational sequence, not a temporal succession, on which we pass judgment. Has the meaning or purpose of a life been duly expressed or not?

Sometimes we feel that a life has been incomplete. This is to appeal from the whole career as expressed in time to the timeless self, to which a short earthly course has, in our opinion, not done justice.

It may further be asked whether the argument which I have been maintaining as possibly valid does not make all Change illusory. But the idea of Change, as Bradley has shown, will not bear examination. It is only true as negating a staticism which would turn the Time-series into a second and incomprehensible spatial system. When we speak of Change, we only mean that Time is not the same as Space.

To a Platonist it is most natural to suppose that Time, in which all things pass, is itself timeless, in that it does not pass. It has been called the moving image of eternity; its perpetuity, for it has neither beginning nor end, is a symbol or copy of the permanence of eternity. Succession is the form of the world of Time; in eternity there is no succession, but the whole is always and everywhere present together. According to Plotinus, "Time is the activity of an eternal soul, not turned towards itself nor within itself, but exercised in creation and generation." The whole of Time is the life-span of the Universal Soul; "its course is composed of equal, uniform, imperceptibly progressing movements." More limited activities, representing Ideas in the mind of God, are spread out over as much Time as they require. It is because these are all subordinate to the life of the Universal Soul that we need not admit the possibility of many time-systems. The same philosopher says that Time is "the measure of some definite limited activity directed to some end beyond itself." Ends are pursued in Time; but there are no ends in Time, which swallows its own children.

From this point of view, the soul is not in Time, but Time is in the soul. It is the form of the Will, and has an essentially teleological character. Bergson, who insists on the reality of Time, objects to teleology, which he regards as only

"mechanism in the reverse order." But mechanism is not a lifeless process; it implies purpose, not indeed in the machine, but in the maker and worker of the machine. Mechanism is the soul-life of the inorganic world, and perhaps is not so different as we suppose from the motive-forces of the organic. It does not shock me at all to hear teleology called reversed mechanism; all purposive life works by machinery, but the purpose is not in the machines.

I am therefore inclined to think that we must ask: For whom is the Time-series necessarily irreversible? In reality, I think—that is to say, to the mind of a perfect intelligence, living not in Time but in eternity—the time-span of any finite being would appear as the imperfect expression of a definite thought of God under the form of a purpose in process of realization. The order of its evolution could not be altered: but the "not yet" and "no longer" would have vanished, and "earlier" and "later" would only indicate fixed positions in a series. Such a perfect intelligence might at will trace the process backwards as well as forwards, just as a chemist may analyse or synthesize the same compound.

For us, in our present state of consciousness, the question is not simple. If we were entirely travelling through Time, we should not be conscious of it. The knowledge of sequences is not itself a sequence, nor in a sequence. Memory is the realization of different states within a unity: if we were mere travellers through Time, we should not remember. In fact, every intellectual process seems to be outside the Time-journey. It is the Will which seems to be involved in the Time-Series, and to commit us to travelling in one direction only. The attitude of the Will towards the past is quite different from its attitude towards the future. The Will seems to be the principle of Becoming, become self-conscious. Our blindness on one side must be the condition of our having Willa. I do not myself see how Will can maintain itself, as Will, in the realm of ultimate reality. For it lives in a

state of radical self-contradiction, rebelling against the conditions of its own existence. It can only gain its end by committing suicide, since we do not will what we have got. The Time-Succession seems then to belong to a half-real world, and to share its self-contradictions. We are partly in this half-real world, and partly out of it. We are enough out of it to know that we are blind on one side, which we never should know if Time were real, and we inside it.

Whether Einstein has thrown any light on the problem of Time, by his attempt to co-ordinate it with Space, as a kind of fourth dimension, I cannot say, for I find his theories excessively difficult to understand. I have long thought that Time must be a fourth dimension; and yet I feel in my bones that this prophet of relativity is not likely to be a true friend to Platonism.

I really have not even attempted to reach any conclusions in this paper. I have not discovered Mr. Wells' Time Machine; and, if I had, I should lose my trip by being unable to make up my mind whether to go forwards or backwards. I hope, however, that I may have started a hare which abler disputants may hunt with more success.

- - - - -

*Meeting of the Aristotelian Society, at 21, Gower Street,  
London, W.C. 1, on December 6th, 1920, at 8 p.m.*

## II.—VARIATION, HEREDITY AND CONSCIOUSNESS.

*By W. P. MONTAGUE.*

*Introduction. A mechanist answer to the vitalist challenge.*

FROM the days of Democritus to those of Darwin there were many attempts by materialistic philosophers to explain the seemingly purposive phenomena of life and mind in terms of the physical categories of science. The total of these efforts netted more of failure than of success. One after another of the problems of inorganic nature had been conquered by the patient application of mechanistic methods, but the outstanding characters of living matter had resisted elucidation by these methods and maintained a stubborn independence. Some of the organic processes and their material products had, to be sure, been reduced to terms of physics and chemistry, but the correlation of organs and functions in the individual, and the adaptation of the various species to one another and to the environment, remained quite unexplained. Up to the time of Darwin the materialists were forced to rely mainly upon an appeal to faith rather than proof. Their method had succeeded in the inorganic fields of astronomy, physics, and chemistry, and should be trusted to achieve a similar triumph in the fields of biology and psychology.

Since the coming of Darwin, however, the balance against materialism has become a balance in its favour. The fact of evolution itself affords a presumption of the ultimate homogeneity of organic and inorganic laws; and the great idea of natural selection as a method by which the adaptation of organs and the evolution of species can be at least partially explained without the aid of design, has put the opponents of materialism on the defensive. Biology and Psychology can no longer be regarded as islands of safety in which the teleological



philosophers may take refuge from the steadily rising tide of mechanistic science. And yet despite the threatening situation in which they find themselves the defenders of the doctrine of teleology have by no means abandoned hope. Bergson in France, MacDougall in England, and Driesch in Germany, have attacked mechanistic philosophy as not only inadequate to cope with the known facts of phylogeny, ontogeny, and consciousness, but as being definitely in conflict with those facts.

The present status of the controversy as I see it is this: In the first place, the anti-mechanists—whether out and out idealists or mere dualists—have succeeded in demonstrating that mechanistic categories, even when strengthened by the Darwinian principle of Natural-Selection, fail to explain the basic characters of vital activity. And they have shown that this failure is not due to the mere complexity of living systems but rather to the incorrigible purposiveness which life exhibits, whether it be studied externally as in biology, or internally as in psychology, and whether we consider its development in the individual or in the species.

In the second place, however, it seems to me that the success of vitalism in the way of destructive criticism is offset by its failure to afford a constructive principle of explanation. Whether we consider the relatively definite entelechy theories of Driesch, MacDougall, and Bergson, or the more general appeals to a category of organicity and to a "fitness of the environment," which characterize respectively the idealism of Dr. Haldane and the Neo-Paleyism of Professor Henderson, we find a failure to provide principles which are homogeneous with the established truths and fruitful methods of mechanistic science. In short, we are confronted at the present time with a situation in which the teleological and psychical characters of living beings remain as aliens in the country of science. The mechanists would have us forcibly deport these dangerous foreigners and then ignore, so far as possible, their very

existence. In other words, they would reduce teleology to an illusion and consciousness to an epiphenomenon. On the other hand, the vitalists would permit teleological processes and psychic agencies to run amuck throughout the whole domain of science, introducing destruction and paralysis, and generally disorganizing the peaceful industry of producing a material cause for every material effect. Each of these plans is dangerous, and in the end fruitless. The real remedy is to assimilate or naturalize the alien entities of teleology and consciousness and give them citizenship in the society of the mechanistic sciences. Until they are thus naturalized, they will continue a menace to the experimental study of nature.

The present paper is an attempt to point out one way in which the process of naturalization can be brought about. Variation, Heredity and Consciousness are the three aspects of life which give most trouble to the advocates of a mechanistic world view. And the fact that the comments which I wish to offer upon these three sets of problems have a certain unity of principle, is my only excuse for dealing in a single paper with such vast and diversified fields of knowledge. Aside from the pretentiousness of its title there is another and more serious defect of my essay for which I ask forgiveness. I have been obliged to use old-fashioned and more or less discredited categories in order to express my thought. In the writings of Hume, Mill and Comte, of Mach and Pearson, and now of Professor Whitehead and Mr. Russell, there has been a steady development of the methodological standpoint of positivism or descriptionism. A notable aspect of this development of descriptionism is the tendency to abandon the old conception of Force, as a mere unjustifiable hypostatization of our feelings of effort and muscular strain. In the face of this formidable consensus of experts, I have talked in my paper about forces and still more questionable entities such as "super-forces." I would plead in defence that the experiences of pressure and effort have as good a claim to objective validity as have visual

qualities of extension and shape; and one of the advantages of the latter for purposes of description is not incompatible with according an objective status to qualities like force and effort which are methodologically less useful. For example, the assumption of the *methodological* behaviourist that mind can best be described in terms of its manifestation in bodily movement, does not imply the conclusion of the *metaphysical* behaviourist that mind itself is therefore unreal. And it seems to me that in quite the same way we could hold that the methodological advantage of describing *force* in terms of its overt and measurable manifestation in change of motion need not imply the metaphysical conclusion that force itself is therefore unreal. And, in addition to the above excuse, I would urge, that as it has proved possible in many branches of physics to translate, without serious change of meaning, the older dynamic terminology of explanation into the modern language of kinematic description, so it might also be possible for a friendly scientific critic to translate into the language of to-day the old-fashioned concepts which my ignorance compels me to use.

Finally as to the actual errors which I may have committed quite irrespective of terminology, I can only hope that they are not too grave or too numerous to render the paper altogether worthless, and that among the experts here present there may be some who, after demonstrating the errors, will be willing to undertake the more difficult business of explaining to what extent if at all my hypotheses can be amended to fit the facts as they know them.

And now, without further preamble I proceed to the consideration, in turn, of the three distinct yet related aspects of vital activity which appear to offer most resistance to mechanistic explanation. It will be my aim to show that as regards each of the three sets of problems it is possible to point out a solution which is statable in mechanistic terms, but which at the same time provides full satisfaction to the demand of the

vitalist or anti-mechanist that the purposive and psychic characters of life be not reduced to an epiphenomenal status of dependence upon blind processes but be recognized as genuinely operative factors in the economy of nature.

## I. VARIATION.

*The analogy of the germinal telogenesis of congenital variation to the psycho-cerebral telogenesis of creative imagination, and the mechanistic explanation of each as the resultant of a system of biological vectors.*

Phylogenetic evolution consists in the progressive realization in the species of organs which are fitted to cope with the environment. Each of these organs of adaptation is a *telos* or purposive structure, and once granted the origin of variations in sufficient number and of a sufficient degree of utility, the teleological process by which they are actualized in the species can be mechanistically explained by Darwin's principle of Natural Selection. But before a *telos* can be actualized in the organism it must have originated in the germ. Teleology must be preceded by *Telogenesis*.

Since the abandonment of Lamarck's conception of the transmission of acquired characters, the most vulnerable point in the mechanistic theory of evolution, and the point against which the vitalists have aimed some of their strongest attacks, is the notion that the useful variations on which Natural Selection must work are accidental or non-purposeful in origin. In matters of purely quantitative variation such as size and weight, we might well admit that good or plus variations and bad or minus variations in the germinal determinants of any organ are equally probable; and a perfectly "blind" or mechanistic conception of their origin would suffice. But the development through a succession of minute variations of such organs as eyes and lungs is a very different matter. The number of meaningful combinations of letters is infinitely

smaller than the number of meaningless juxta-positions; and similarly the number of useful combinations of cells and cell-elements such as would be required to constitute an organ like an eye, is infinitely smaller and their occurrence is therefore infinitely less probable than the number of useless or harmful arrangements. That the molecules and atoms of a fertilized germ-cell should group themselves by mere chance, *i.e.*, by merely physical or blind forces, in such a way as to initiate or advance the formation of a useful bodily organ, would seem to be enormously improbable. Such general considerations, combined with the more special objection that the earlier stages in the development of useful organs have no survival value on which Natural Selection can work, have led the vitalists to believe in what is called "orthogenesis," *i.e.*, an intrinsic tendency of the germ-plasm to vary in one of the comparatively few directions that make for progress rather than in any of the virtually infinite number of ways that would be useless.

The remedies proposed by the vitalists are, however, worse than the disease which they are designed to cure. We must grant the existence of something like orthogenesis; but to explain it by abandoning mechanistic categories and involving an *anima et machina* as first aid to the physiologist when in trouble is bad hypothetical methodology and hurtful to scientific progress. The activities of a Drieschian *entelechy* or a Bergsonian *elan vital* are at best hopelessly incommensurable with the known modes of bodily activity.

The first and most natural way out of the difficulty would consist in a revival of the Lamarckian belief in the ability of the soma-plasm to impart to the germ-plasm which it contains the specific adaptive improvements in eyes or lungs which had been acquired by the animal through functional adjustment to the light and air of its environment. But lack of empirical evidence for the inheritance of such acquirements, combined with the absence of any known mechanism by which specific somatic improvements could be transmitted to the reproductive

cells, suffice to convince the great majority of biologists that this way out is fruitless. Moreover, even if Lamarckianism were acceptable, it would scarcely apply to some of the most striking of the congenitally useful characters, such as those of the worker bees, in which there has been little chance for the parents to have acquired the advantageous capacities which appear in their offspring.

A second way out of the difficulty might seem to be furnished by the mutation theory of De Vries; but this innovation upon Darwinism meets the difficulty to which the parent theory was subject in the matter of explaining how Natural Selection could act on those organs which in their incipient stages possessed no survival value, only at the price of increasing to a preposterous degree the overdrafts on the theory of probability. For, if it is difficult to see how merely physical or chemical disturbances in the germ-plasm could suffice to produce even the minutely favourable variations which Darwin himself believed in, it is proportionately more difficult to believe that "mutations" or large variations could be the product of blind or mechanical causes. It is hard enough to believe that handfuls of letters thrown into the air would fall into place as intelligible words: it is infinitely harder to believe that they would so fall as to make whole sentences. In short, any advantages of the De Vriesian mutations (as substitutes for the minute variations of the Darwinians) are fully offset by the greater improbability of such mutations arising mechanistically.

In difficulties of this character it is often possible to derive help from analogies; suppose then that we turn aside for a moment from the problem of the origin of useful variations in the germ to that other problem (too much neglected by psychologists) as to the origin of useful variations in conscious life. It is so natural for us to consider the teleological phase of mental activity in which purposes are deliberately realized in conduct or in art, that we are apt to forget that earlier and

more spontaneous telogenetic phase in which the ideal or purpose originates. Yet this earlier telogenesis is at least as important as the later teleology; and it is most certainly its necessary condition. Before an ideal can be actualized it must have originated.

Telogenesis is the heart of what Bergson calls "creative evolution"; and that great philosopher has clearly demonstrated that creative evolution depends upon the cumulative preservation of the past. Because of this preservation of the past every product of a telogenetic process must have two basic characteristics: first, the characteristic of *pertinence* and, second, the characteristic of *novelty*. Since a telos arises from the past, it must be pertinent or relevant to it; it must carry on or carry out the tendencies which generate it, and make explicit what was implicit. But that which is a function of the whole past cannot be a mere repetition of a part of the past; hence the telos that arises will not merely be *pertinent*, it will also be *novel*. Real duration of the old is the condition and cause of a real creation of the new.

The theory that evolution is the working out of a divine plan—a repetition in time of what pre-existed in eternity—is criticized by Bergson on the ground that such an explanation does not solve the problem of design in the cosmos, but merely shifts it from the relatively accessible domain of the evolution of species in nature to the relatively inaccessible domain of the genetic psychology of the Deity. The question of how purposes can originate in the world is not answered by saying that they originated at a previous time in a divine or absolute mind.

Let us now consider some of the ways in which the two characteristics of *pertinence* and *novelty* are expressed in the telogenetic processes of consciousness.

(1) In cognitive experience, the formation of a hypothesis which harmonizes and explains a mass of data is a typical case of telogenesis. The hypothesis flashes up in the creative

imagination of the scientist. It is *novel* in that it differs from each of the remembered facts which contributed to generate it; and at the same time it is *pertinent* in that it explains them all. It reconciles their hitherto conflicting or unrelated tendencies, and carries them out and through to a victorious peace.

(2) In the conative sphere, telogenesis is virtually identical with external adjustment or *adaptation*. When in action, our problems are solved not by carrying out in detail a pre-meditated plan, but rather by novel and pertinent adaptation to the exigencies of the environment. This power to make unpurposed yet purposeful adjustments is sagacity.

(3) In the domain of affective experience, telogenesis is exemplified in almost any case of artistic creation or expression. Humour, in particular, because of the suddenness and spontaneity which is of its essence, is a perfect case of telogenetic activity. The flash of wit or pat remark, when at its best, is the acme of both pertinence and novelty. It is fresh, sudden, original, yet it expresses the quintessence of a prior situation with more accuracy than could be attained by the most laborious copying. I think we may say that, in general, it is only second-rate art that is either romantic or realistic. For it is only when art is second-rate that it will have to secure novelty at the expense of accuracy, or accuracy at the expense of novelty. In first-rate art the best of the one will be the best of the other. The most pertinent illumination of nature will be also the most novel and original.

(4) One of the best examples of telogenesis, and one in which the cognitive, conative and affective interests are equally involved, is afforded by the activity of speech or talk. In talking, a man does not and cannot plan out his words in advance. His sentences are not duplicates of what pre-existed; they do not repeat his thoughts, they express them. It is only in giving a speech that has been committed to memory

11929



that one's talk is teleological rather than telogenetic. In unpremeditated talk, the meanings demanded by the topic under discussion are held by the mind in solution, and the words spoken are the crystals precipitated from the solution. Now there are some psychologists who are so biassed in favour of teleology that they would explain these cases of telogenesis by assuming that the novel and pertinent creations of consciousness are always pre-existent in a sub-consciousness. Even if this were true, the problem of accounting for these useful variations would only be shifted to another and less manageable domain. We should immediately have to inquire as to how the words and sentences pre-existent in the sub-conscious had themselves originated. In short, the telogenetic process in which variations arise that are at once pertinent and novel, purposeful yet unpurposed, is an ultimate fact, and can in no way be reduced to mere teleology.

It will be recalled that we digressed from our primary problem as to the origin of useful variations in the germ-plasm in order to see if the better-known but analogous cases of telogenesis in conscious activity would afford any suggestion for a mechanistic solution. In what follows, I shall try to show that the foundation for such a mechanistic solution is afforded by the principle of *biological vectors*, and that that principle is applicable to the two types of telogenesis exhibited by vital systems to creative imagination no less than to congenital variation.

A vector is a quantity having both magnitude and direction. It may be symbolized by a straight line of definite length and definite direction. The sum of two vectors is given by the diagonal of a parallelogram whose two adjacent sides are the vectors to be added. Vectors or directed lines can represent not only velocities and accelerations or forces, but also the higher spatio-temporal derivatives such as accelerations of accelerations or "super-forces" which will be explained in the second part of the paper. The result of combining or

fusing two or more of such forces or "super-forces" will always be expressed by a resultant vector which is got by the process of geometrical addition just mentioned. A very simple case of the combination of vectors will serve as an illustration of the general law. A body acted upon by a westward force and a northward force, simultaneously, will move or tend to move in a north-westerly direction. If the magnitude and direction of the westward force is represented by a three-inch line pointing west, and the magnitude and direction of the northward force is represented by a four-inch line pointing north, and making a second side of a rectangle, then the magnitude and direction of the resulting motion or tendency to move will be represented by the diagonal of the rectangle, that is, by a line five inches long and having a direction slightly west of north-west. In this case, as in others, the resultant of a combination of vectors will be a vector having the qualities of *pertinence* and *novelty*. For the north-westerly force is pertinent in that it carries out the westerly and northerly characters of its components, while its novelty is manifest in its differing from each of those characters. It is like orange light which differs from the red and yellow from which it arises, while at the same time, in its own new and richer hue, it carries out and expresses the simpler and more primitive characters of its constituents.

Now, without committing ourselves to a strict psychophysical parallelism we can accept the theory that mental states are somehow correlated with physical states. And these physical correlates of mental states can only be conceived as of the nature of velocities, accelerations or forces in the cerebrum, in other words as vectors and groups of vectors. The unity and continuity of the cerebral system will provide for a constant interaction and combination of these cerebral vectors, with the consequence that new vectors will be produced as resultants or summations. Each of these resultants will have the characters of *pertinence* and *novelty* in relation to

the constituents by which it was generated. It will, in short, have precisely the qualities which we found to be exemplified in the telogenetic products of psychic adaptation and creative imagination.

In this connexion it is important for us to realize that while mechanists are not agreed on any metaphysical theory of the nature of the relation of a mental state to its physical concomitant, they are agreed that the concomitance itself is a fact. Hence any fusion or combination of the cerebral correlates of mental states must be accompanied by a corresponding fusion or combination of the mental states themselves. And since the combination of cerebral factors is of necessity a vector addition whose sum must express in a new tendency the harmonious fulfilment and unification of the pre-existing tendencies, so on the mental side there would with equal necessity result those same unpurposed yet purposeful syntheses which were given as illustrations of telogenesis in the field of conscious activity.

How will our principle of biological vectors apply to the problem of the origin of useful variations in the germ-plasm?

The fertilized germ of an animal is like the human brain, in that it is the bearer of a mass of tendencies representing the past. In the brain these traces of the past constitute the memories from the synthesis of which arise the felicitous telogenetic novelties of *creative imagination*. In the case of the germ, the traces of the past constitute not memories but the hereditary determinants from whose orthogenetic synthesis arise the useful variations or telogenetic novelties of *creative evolution*.

If the millions of ancestral qualities which must be embodied as determinants in the chromatin of the germ-plasm are conceived as we conceived the physical correlates of the brain's memories, namely as of the nature of velocities, accelerations, or forces, they will together constitute a vector system, constantly giving rise to other vectors, which will be not only

novel but pertinent. Like the flashes of inspiration these resultant vectors will express in new ways the combined tendencies from which they arose, and without having abandoned the categories of mechanism we shall have justified orthogenesis.

In short, creative evolution and creative imagination are diverse in media, but identical in activity. Nature is not stone blind like the atoms of the older materialism, nor, on the other hand, is she as depicted in the older theism, a moral agent endowed with prevision and engaged in the realization of pre-existent plans. She is an artist who works as she goes, giving spontaneous inspiration rather than deliberate edification and beauty rather than goodness.

## II. HEREDITY.

*The preservation of the past in the present, and the teleology of assimilation, reproduction and ontogeny mechanistically explained by the conception of life as a system of super-forces.*

There are two facts about heredity on which the vitalists base their protest against mechanism. In the first place there is the capacity of life to preserve in the germ the infinitely rich manifold of hereditary determinants embodying the past ancestry of the plant or animal, and in the second place there is the teleological capacity of life to actualize this heredity-manifold progressively in the stages of embryonic growth.

I shall try to show that if we conceive of the germ as a hierarchical system of what I will call "*super-forces*," it will be possible to explain both of these aspects of heredity in terms of mechanistic categories.

The basic concepts of physical science are Mass, Space and Time. The other conceptions are derived by combining these notions.

Thus, the velocity of a moving body is expressed by dividing the space through which the body moves by the time

during which it moves; and the velocity of the body at any instant can be expressed by the limit approached by the fraction as  $s$  and  $t$  approach zero. Acceleration is the rate at which a velocity is changing. Force is the product of the mass and the acceleration. Momentum can be expressed as the product of the mass and the velocity. Energy can be expressed as one-half the product of the mass and the square of the velocity. According to Professor Karl Pearson, while these conceptions are sufficient for the ordinary purposes of mechanics, we could form concepts of higher orders of acceleration which would conform to the same laws of geometrical representation and combination as apply to simple accelerations and to velocities. Thus the rate at which an acceleration was changing or tending to change would be the first of the higher orders of acceleration, and the rate at which this rate itself was changing or tending to change would be the second of the higher orders of acceleration. Each of these successive orders of acceleration is derived from the preceding order by dividing by the time factor and taking the limiting value which the resulting fraction approaches as the numerator and denominator approach zero. This process is known as differentiation; and the series of higher orders of acceleration which result from the process constitute what are called the higher derivatives of space with regard to time. Inasmuch as force is defined as the product of the mass and the simple acceleration to which the mass is subject, we can use the term "super-force" to denote the product of a mass-factor, and any higher order of acceleration which it may embody, or to which it may be subject.

So much for the meaning of super-forces: I wish now to call attention to some of their characteristics which have a bearing upon the problem of the nature of the germ-plasm. In the first place, they can exist as physical realities without being visible or externally observable. Even velocity itself, the first of the derivatives of space with regard to time, is

only visible through a series of instants and not at a single instant. And when the velocity is zero, and the body appears to be quietly resting, it may possess any degree of acceleration, or of super-acceleration without exhibiting any sign of such potentialities. A single particle may be the bearer, at one and the same instant, of any number of successively higher super-forces. That is to say, it may have an acceleration, and a tendency to change that acceleration positively or negatively, and a tendency to change that rate of change, positively or negatively; and so on without limit. And, as we have said, these excessive degrees of super-force are accurately expressible in terms of the successive derivatives of space with regard to time. From this there follows the important consequence that a very meagre system of molecules could be the bearer of an indefinitely rich manifold of super-forces, not existing side by side or extensibly and visibly, but superposed on one another intensively and invisibly. Now, despite our ignorance of the intimate molecular and inter-molecular structure of the germ-plasm, there are two things about it in this connexion which we know: (1) that the number of hereditary tendencies stored up in it from past generations is indefinitely rich; and (2) that if by some impossibly perfect microscope we observed all that there was to observe in such a germ, we should see nothing but the chemical atoms with their constituent electrons grouped together in molecular and inter-molecular systems. The masses, sizes and shapes of these atoms, their relative positions and velocities, would be observable, and they would certainly seem to constitute a system rich enough to be an adequate causal ground for the somatic structures that are to issue from them. And yet, despite this seeming richness of the theoretically observable manifold of atoms in the germ-plasm, a moment's reflection will reveal the pitiful inadequacy of the merely spatial and kinematic aspect of the germ to afford a sufficient causal ground for the somatic effects that are to follow. For many,

if not all, of the resulting soma-cells will as individuals be as complex in structure as the original germ-cell; hence all the causal determinations of the germ will be needed to explain them. Yet this is only the beginning; for there is the whole incredibly complex and adaptive arrangement of these cells in the tissues and organs of the soma at any one stage of its development to be accounted for by the nature of the germ. Nor is even this all; for any one of these last-named somatic complexes is but one of the long series of diverse forms which evolve in a temporal series through all the stages of embryonic and post-embryonic growth. And this series shows in its temporal structure the same degree of purposeful complexity as is found spatially in any one of its stages. Nor can the environment help us here. For while it is of course an absolutely necessary condition for the development of the germ and is in perpetual relations with it, yet its role is relatively passive so far as concerns the specific hereditary characters which were all determined by what the germ contained, and which are preserved intact through all the interactions of the germ and its environing food. Indeed, as a final consideration showing the impossibility of accounting for the spatial and temporal richness of the soma in terms merely of the theoretically observable distribution of the atoms in the germ-plasm, we may note that if that distribution were all there was to the germ, its specificity such as it was, would be completely washed out and lost in the interaction with the environment; for the arrangement of the atoms of the system after the first contact with the environment would be as much characteristic of the latter as of the germ itself; so that as the interaction continued, the living being would lose more and more of the highly specific nature of its germinal origin and would take on more and more of the relatively unspecific character of its environment. And at the end of such a give-and-take process, the germ-cells of the next generation would have almost none of the characters of the species. Instead of this fading out of

the complex of germinal characters, through successive admixtures with the environment, we find, as we have just said, precisely the opposite state of affairs. The individual somehow preserves all its hereditary specificity quite intact throughout the long and complicated processes of its growth to maturity. If, then, it is impossible for these reasons to identify the hereditary characters no matter how numerous or complex, with the positions and velocities of the atoms of the germ-plasm, with what physical aspects of the latter can they be identified? With none, say the vitalists, who thereupon proceed to bring in their non-physical entelechies, psychoids, etc.

According to the hypothesis here defended self-perpetuating *complexes of hereditary characters can be and must be identified with the super-forces of the germ-plasm*. For while these super-forces are strictly physical in nature and capable of mathematical formulation as the higher derivatives of velocities, it is they and they alone which can constitute an indefinitely rich intensive manifold of separate specific tendencies, such as we know the germ to contain; and it is also they and they alone which are able to preserve their own systemic structure intact through all the vicissitudes of interaction with environing systems. That this last claim is justified can be seen by considering that even acceleration, not to mention super-acceleration, is not affected directly by a change of position. Thus when a falling body is stopped in its fall and brought to rest, its gravitative acceleration continues as before. The value of a derivative is not altered by an alteration in the value of the derivatives of lower order than itself, and consequently the super-accelerations or super-forces in the germ-plasm, which are represented by these higher derivatives can preserve their pattern unchanged throughout the morphological changes of embryonic growth.

And now that we have seen the striking correspondences that obtain between the rich intensive manifold of self-perpetuating hereditary characteristics in the germ-plasm and



the equally rich intensive manifold of self-perpetuating super-forces which we are suggesting as a mechanistic explanation of this germinal specificity let us consider the second of the basic characters of the germ-plasm, namely, the sequential teleology of the embryonic process in which are progressively unfolded the series of hereditary forms. 111929

The process by which the fertilized cell divides into two cells, each possessing the life-pattern of the parent, involves the transposition of the complex of hereditary characteristics from the system of atoms which originally possesses it to the system of atoms which up to that time has not possessed it, but which as relatively simple food material has been stored in the cell. The initial mystery of growth is this mystery of assimilative anabolism by means of which one system of atoms within a cell conveys its life-pattern to another system. The actual division of the cells is only the climactic stage of the process of transference of a life-pattern of hereditary characteristics from the primary constituents of a cell to its secondary or food-constituents. Now it has long been noted that such phenomena as the splitting up of the chromosomes and the formation of duplicate centrosomes bear a *prima facie* resemblance to processes of magnetic and electrostatic induction in which a force-pattern is transferred from one body to another, but so far as I am informed, the resemblance of electrical induction to what happens in the cell is so vitiated by the multitude of differences between the complex protoplasmic substance and the relatively simple media of electrical and magnetic induction, that the analogy has not led to any fruitful results. Now if our hypothesis of the identity of the life-pattern of a cell with the hierarchical system of super-forces of which its atoms may be the bearer is correct, the analogy between biological and physical induction might be rescued.

And just as the electric or magnetic field constituting a pattern of relatively simple stresses can induce in suitable material nearby, a corresponding pattern of stresses, so we

should expect a cellular complex of super-forces to induce a corresponding pattern of super-forces in the suitable material nearby. And just as iron particles in the neighbourhood of a given magnet conform to the lines of force of that particular magnet, so would food particles within the field of a given cell conform themselves to the biological pattern of that particular cell, becoming nerve tissue, muscle tissue, or bone tissue, as the case might be.

Anabolism is thus the transmission of the chemical form of the substance that eats to the substance eaten. In this way living matter renews and increases its own substance at the expense of other matter.

When a cell has in this way increased its own substance to a certain point, then either with or without the stimulus of another cell, *i.e.*, either sexually or asexually, it reproduces itself in new cells. The daughter cells exhibit more or less of the pattern and chemical structure of the parent cell, and so in unicellular reproduction no less than in assimilation, the essence of the process is the transmission of a form or pattern from one body of matter to another.

Now the ontogeneses or embryonic development of a multicellular organism might appear to be of a quite different nature to the processes of assimilation and unicellular reproduction which we have just considered. For here we have a group of cells, which in their growth and reproduction result not only in new types of cell-pattern, but also in a whole series of cell-groupings. New tissues and new organs are progressively differentiated from the seemingly simple and homogeneous germ-cell. But here too we can regard the process as only another example of the capacity of living matter to impose and transmit its own form. For the cells of each new generation will have their natures determined not merely by the individual parent cells, but by the group of parent cells acting collectively. The pattern of the new cell will thus be a compound, one set of characteristics a direct inheritance or reproduction of its own

parent cell, and the rest of its characteristics determined by the structure of the group and its position in that structure. We should thus expect a unified system of developing cells to exhibit a progressive differentiation of form. To symbolize the process let us denote the original fertilized cell from which a complex organism is to develop by  $A$ , and the two daughter cells into which it divides by  $A_1$  and  $A_2$ . Now, when one of these daughter cells, say  $A_1$  proceeds in its turn to divide, the resulting cells should be determined in their pattern not merely by  $A_1$ , but by  $A_1$  modified by  $A_2$ . The compound pattern thus resulting in the second generation we could symbolize by  $B$ . The  $B$  cells will in their turn give rise to new cells whose pattern will be a compound of the  $B$  characteristics modified by the pattern imposed by the cell group. This third type of cell we could symbolize by  $C$ , and so on. These familiar facts are generalized in the statement that the character of any part of an organism is determined partly by its immediate cell parents and partly by its relation to the entire organism. Now certain experiments, described by Driesch, which have been performed upon the embryos of frogs, throw an interesting light on the connexion of the two features. If a part of the embryo of a frog be properly separated from the rest, it will develop; but sometimes it develops into an entire tadpole of reduced size and sometimes into a specific part of a tadpole. These divergent results would seem to indicate that the two sets of characteristics which constitute the cell-pattern of each cell in a multi-cellular organism are relatively distinct, and that sometimes one set and sometimes another dominates in its descendants. In the case in which a separated part of the embryo develops into an entire animal the original characters of the parent cells have proved more potent than the characters superimposed by the general group. The germ plasma, as we might say, triumphs over the soma-plasma and the cells act like germinal or reproductive cells. But in the case in which the fragments of the embryo develop only into specific parts of the

animal, such as special tissues and organs, why here it is the soma-plasm characters that triumph over the germ-plasm characters. That is to say, the differential characters in each cell which have been superimposed upon it, not by its parents but by the whole group of cells, in virtue of its position in that group, determine a continuance of its development into the special tissues and organs demanded by the group as a whole.

Now, in the light of such facts, it is possible to understand in general, although the details are hidden from us, how certain of the cells of a complex organism might, and probably would, always retain as their dominant characteristics the pattern inherited from the parent cells, rather than the differentiating pattern which would be due to their relation to the group. Such cells would be the germinal or reproductive cells whose function it is to reproduce the new organism as a whole rather than some special organ or tissue. So, though each cell in a complex organism might be regarded as theoretically capable of reproducing, under proper conditions, the organism as a whole, yet only those cells which were not forced by the demands of the group as a whole to develop some special instrument of service would actually serve as the seeds of a new generation.

Now all this is of course merely descriptive and not explanatory. But in view of the general theory I am arguing for, I have thought it worth while to indicate how the distinctively vital processes of growth and reproduction can all be regarded as the different manifestations of a single principle—the principle in accordance with which living substance imposes its characteristic form or nature upon new matter. And it is here that the concept of each cell as a complex of super-forces appears to me to be helpful. We know that it is a characteristic of a system of forces or potential energies not only to pass into motion and to result from motion, but also to superimpose its form upon its environment. Every stress implies a counter-stress of the same character as itself. A magnet not only tends to produce motion in the iron filings that come into its

field but it imposes upon them its own stress pattern. An electric charge not only attracts or repels into motion another charge, but it induces a counter-charge on neighbouring bodies. If any part of a living cell is the bearer of a complex system of stresses or potential energies we should expect to have those stresses imposed upon and duplicated in any matter that was suited to take them. The process by which food substance is assimilated to the tissue of the cell would be, as we have said before, analogous to the process by which iron filings arrange themselves in accordance with the field of force of a magnet. In protoplasm, however, the stress patterns that are transmitted are primarily of a chemical rather than a physical order, and manifest themselves in the grouping of atoms into new molecules. It is apparently only in carbon compounds of the kind that compose protoplasm that there is sufficient flexibility of molecular structure to allow of any very noticeable or continued propagation and variation of stress patterns from one molecule to another. Crystallization, which has always been recognized as more or less remotely analogous to life, may be identically the same in principle but with the single all-important difference that in crystallization it is only a stress pattern between molecules that is reproduced, whereas in protoplasm, thanks to the peculiar structure of carbon, instead of the meagre variations of intermolecular or physical stress patterns, it is possible to transmit by a process analogous to electrostatic inductions those intramolecular systems which we have termed "super-forces."

The hierarchical systems of super-forces of which protoplasm is the bearer, are, however, not only incomparably more varied than the simple stress-symptoms of crystals, but in their chemical manifestations they seem to furnish an exclusive instance of an object definable in purely physical terms and at the same time embodying a system of invisible and intensive magnitudes. So far as I can see there is no limit in theory to the number of strains which might be superposed in series

upon a single material field. Each of these imposed strains would be the trace of a past event and the promise of a future event. The system would in short consist of a temporal series of past and future events compressed into a series of intensive magnitudes symbolized by the successively higher derivatives of space with regard to time, and actually though invisibly present in their totality at every instant. We may assist our imagination to appreciate the nature of such a system if we think of a rope upon which there has been imposed in succession a long series of twists on twists. As long as such a rope is held tight, it will embody at each single instant the whole series of successive strains to which it has been subjected, in an invisible intensive hierarchy; and if there were a medium suited for the purpose, it might convey to that medium by a kind of induction its own pattern of super-forces. When the rope is released, however, it will unfold or untwist, and yield back in the form of a visible temporal series something like the series imposed upon it, but with the order of terms reversed.

If for the gross and meagre plasticity of the rope we substitute the infinitely varied plasticity of protoplasm, and if for the brief series of crude twists given to the rope and returned by it, we substitute the incredibly extended succession of specific energies which have been received by the cell, and infinitesimal traces of which have been retained, then we shall have something like a mechanistic explanation of the two outstanding mysteries of heredity. These, it will be remembered, were (1) the mystery of how a minute germ can contain and maintain in all integrity the determinants of a million generations of past life; and (2) the mystery of how that same germ with admirable teleology can actualize in unicellular reproduction and multicellular ontogeny the complex of potentialities with which it is invisibly pregnant.

It remains to us now, in the concluding section of our discussion, to meet the last and most formidable of the three challenges of vitalism—the challenge to explain in mechanistic

terms the general characters of conscious thought and activity, and the peculiar characters of the qualitative and durational elements of psychic existence.

### III. CONSCIOUSNESS.

*The points at issue between mechanistic parallelism and vitalistic interactionism. The general and special characters of conscious life. The mechanistic explanation of the former by the conception of cerebral super-forces or potential energies, and of the latter by the conception of sensations as modes of "energy."*

The general controversy between mechanism and vitalism, when applied to psychology, becomes the more specialized controversy between psycho-physical parallelism and interactionism.

Parallelism, which on all practical issues is indistinguishable from epiphenomenalism, insists (1) that you cannot conceive of a non-spatial state of consciousness in a causal interaction with a physical body; and (2) that even if you could, the law of the conservation of energy would be violated unless every effect in the brain were produced by a physical cause. Consequently, consciousness must be regarded as a non-intervening or "parallel" aspect of brain processes. As against this theory, the interactionists contend (1) that consciousness is of such a character that you cannot conceive of it as a mere concomitant of the blind or mechanical motions in the brain; and (2) that even if you could so conceive it, its existence as an epiphenomenon would be opposed to the biological law that vital functions tend to be developed and preserved on account of the useful effects which they produce. Thus each party to the controversy is supported by the inconceivability of its rival and by the apparent demands of physics on the one hand and of biology on the other.

The psycho-physical dispute between mechanist-parallelism and vitalist-interactionism is not mitigated but only confused

by mixing it with the epistemological dispute between realism and idealism. The problem is just as clear-cut and perplexing when translated into the language of idealism or of phenomenalism as when left in the simpler and more primitive language of realism. To describe the motions in your brain as streams of actual or possible perceptions of an external observer, or as abstractions from an organic whole of experiences, does not make it any easier to conceive them as causally related to the private and personal unity of thoughts and purposes, which constitute your mind.

The characters of mind or consciousness on which the vitalist bases his challenge to the mechanist fall into two groups, which we will call the general and the special. The general characters are those common to all vital systems; the special are those that are or that seem to be peculiar to consciousness, notably the baffling specificity or qualitateness of its elements. Let us consider them in turn.

Under the general characters may be enumerated the following: (1) *Telogenesis*, or the capacity to initiate useful or purposive variations; (2) *Telology*, or the capacity to reproduce or actualize a form or pattern by transmitting it through a kind of induction from one body to another; (3) *Extension in time*, or the capacity of living matter to sum up at each present moment of its existence a long series of past events in the form of an invisible hierarchy of intensive magnitudes.

In the first section of this paper, in which Telogenesis was the topic considered, we endeavoured to show that between the activity of the germ, giving rise to useful and inheritable variations, and the activity of the brain, giving rise to novel and pertinent ideals, there was not only a vague analogy but a profound identity. By conceiving of germ and brain as systems of forces and super-forces, each element of which could be treated as a vector, we were able to interpret both kinds of telogenesis as a process of vector addition. The germ and the



brain are as closely connected in their teleology as in their telogenesis. The process by which the stress-pattern of hereditary determinants is transmitted in assimilation and reproduction from the original germ-cell to the food particles within it, is identical in principle with the process by which the stress-pattern of a purpose based upon memories stored up in the cerebrum is transmitted to or actualized in a series of moral actions or an artistic creation. For example, a man having as his purposes the artistic telos of painting a beggar and the moral telos of giving alms to the beggar, actualizes those ideals on his canvas and by his conduct. And the capacity to transmit from the brain to the outside world of canvas and conduct these pre-existent patterns is essentially identical with the capacity of the germ-cell to transmit its pattern of chemical forms to the food contained in it and to other cells. To conceive of the pre-existent pattern as part of a system of super-forces and of its transmission as a kind of induction, affords a basis for interpreting both germinal and cerebral teleology in mechanistic terms.

So much for telogenesis and teleology. The third of the general characters in which the conscious action of the brain resembles the ontogenetic activity of the germ is the capacity to extend in time, and embody at each present instant in an invisible system of intensive magnitudes a long series of past events. Here again the arguments for identifying this present past with a hierarchy of super-forces or forms of potential energy superposed one upon another apply equally to the system of acquired memories stored up in the brain and to the system of inherited determinants stored up in the germ. Neither brain nor germ would exhibit to an external observer the essentially private history of the past contained in it. Mere positions and velocities of the atoms, if adequately disclosed by a perfect microscope, could show nothing but what was present. A hierarchy of super-imposed stresses is the only physical analogue of life's power to extend in time.

Despite the resemblances of conscious life to life in general with respect to telogenesis, telology and temporal extension there are certain differences between the two systems that should be kept in mind. The central nervous system exhibits in a new way the vital capacity for retaining and expressing specific potentialities. Instead of assimilating energy joined with matter in the form of food-particles, the brain takes its energy "neat" and assimilates it as it comes in the form of sensory impulses. And by storing up traces of the specific forms of vibration that proceed from extra-organic objects and traverse the afferent nerves, it builds up a "psychic organism," a life within a life, composed not of differentiated forms of matter, but of differentiated forms of energy. These cerebral energy-forms are the instruments of memory, and they implicate or reveal a world outside themselves both in time and space. It is by virtue of the self-transcending implications of cerebral traces that we are enabled to experience duration and to act teleologically, *i.e.*, to act at each moment with reference to events of the past and future.

There are several other curious analogies which hold between the field of consciousness and a field of super-forces of potential energies. There is, for example, the polarity of subject and object which has its analogue in the universal opposition of forces to one another; every tendency to action engendering an equal and opposite tendency to reaction. There is also the primary unity of a field of force (as distinguished from the essential plurality of a mere aggregate of material particles) and the perfect and instantaneous rapport between its components. These characters correspond respectively to the unity of consciousness and to the organic and reciprocal interaction of its contents.

Aside from these various analogies the hypothesis here defended is greatly strengthened by the fact that sensations seem to arise at the very times when the sensory neural currents are being redirected at the cerebral synapses into

motor currents of discharge. And as no form of motion can be changed in direction without some of its energy passing through a latent or potential phase, it seems highly probable that the not-externally-observable potentialities into which neural energies are transformed are identical with the not-externally-observable psychic states which then and only then come into existence. Moreover, when the neural stress is intense the sensation is also intense; while the smoother and more automatic the neural current, the less vivid is the consciousness that is synchronous with it.

But let us turn from these general and structural characters which (with some variation) are shared in common by conscious life and by the life of cells, to those other and more special characters which are peculiar to the contents of consciousness and definable in physical terms. These exclusively psychological characters are (1) the pure qualitateness of sensations; and (2) the duration, or specious presentness, of all former consciousness.

Not even mechanists attempt to reduce these characters to physical terms; they content themselves with the view that mental states, as such, are epiphenomenal concomitants of cerebral motions and thus subject, vicariously as it were, to the mechanistic laws of the motions with which they are concomitant.

I believe that it is possible to interpret in physical terms the very sensations themselves, and furthermore, I believe that this ultra-materialism can be seen to satisfy the legitimate demand of the vitalists, that mind be regarded as a really efficient determiner of bodily motions rather than as the epiphenomenal concomitant of them. But if the hypothesis which I am about to propose is to convey any meaning, it will be necessary to bear with my attempt to express what, so far as I know, is a new category.\*

---

\* Some years ago, after I had published a rough preliminary formulation of the conception that I am now about to present, my attention

Our customary modes of thought recognize mere rest as the only alternative to motion; and while there can be many degrees of motion there can only be one degree of rest. I want to suggest that there can be many degrees of rest, or rather that there are modes of existence on the other side of mere rest. Just as zero is the boundary between the decreasing series of positive numbers and an equally rich increasing series of negative numbers, so the resting condition of a body may be the boundary between the decreasing series of its positive velocities and an equally rich increasing series of its negatives of velocity. By these negatives of velocity, I do not, of course, mean what are ordinarily called negative velocities or negative motions, *i.e.*, mere movements in an opposite or negative direction. It is not the direction that is to be negatived but the motion itself. Now energy may be roughly defined as the quantity of actual or potential motion, the quantity being measured for certain reasons in a certain way, *viz.*, by the product of a mass-factor and the integral of the velocity, *i.e.*, the square of the velocity divided by two. Energy then is, as it were, the tendency to change spatial position. Now the negative of energy would be a tendency to cling to or endure in one position. It would, perhaps, be related to velocity as inertia is related to acceleration. Let us combine the root of the word energy with alpha privative, and coin the word *anergy* as the name for this new condition. This anergy or duration will increase as the velocity decreases: and if we use the ratio  $s/t$  to denote velocity we can use the ratio  $t/s$  to denote slowness or duration. As we decrease the fraction  $s/t$  denoting

was called to an earlier book, to which I cannot now get access, in which *feeling* was interpreted as a sort of negative correlate to *force*. There was, as I remember it, no attempt to define it in terms of space and time, and no attempt to conceive of the forms or traces which it might leave after the stimulus inducing it had ceased to act. But in its general character it was like what I shall refer to as "*anergy*." The title of the book was something like *Mind and Force*, and the author's name was, as I recall it, Townshend.

the fastness of the change, we shall increase the reciprocal fraction  $t/s$ . In other words, the less the speed the more the slowness. Suppose now that the speed becomes zero, then the slowness will become infinite. When slowness becomes infinite it ceases to be a mere negative *adjective* and becomes a true *substantive*, i.e., a thing existing in its own right. As long as a body is actually moving at all, its duration is merely potential. When it stops and its motion becomes potential, its duration becomes actual. That which was a *traversing of space* has become an extension in time, a "chunk" or lump of *durational being*.

When a vibration-wave proceeding over a sensory nerve is gradually brought to a stop by the resistance of the synapse, its energy is transformed from a visible and kinetic form to an invisible and potential form. As its velocity passes through the zero-phase, its slowness passes through an infinity-phase. I ask you to entertain the suggestion that this *infinity-phase of slowness* is the common stuff of all sensations and that the critical points of zero and infinity through which the motion and the slowness respectively pass, afford the basis for that qualitative absoluteness and discontinuity that differentiate sensations from mere rates of change. If we accept this suggestion and admit provisionally that ( $t/s = \infty$ ) is a kind of definition in terms of *quantity* of the general *quality* of mere durational being common to all sensations, we shall find as a reward for our faith, a very striking corroboration of Fechner's interpretation of Weber's Law. For when the wave of neural motion encounters resistance at the synapse, each of its cross-sections in continuous series will be transformed successively into cross-sections of durational being. And the intensive quantity of durational being thus produced will be the result of a continuous summation or integration. Thus, the intensity of the sensation  $t/s$  will increase to its maximum through the time that the velocity of the wave decreases to zero; and consequently it can be measured by the product of a mass factor (which is large for sound and small for light and

which I will not here discuss) and the integral of the reciprocal of the velocity with regard to the velocity, *i.e.*,

$$\int_{v_1}^{v_0} \frac{t}{s} = \log \frac{s}{t} + C.$$

In other words, if the being of a sensation is as I have described it, the intensity of a sensation will tend to increase with the logarithm of the stimulus, rather than with the stimulus directly. This deduction of Fechner's Law, permits us to understand the curious analogy to that law which determines our appreciation of the intervals of pitch. The vibration-numbers which cause sensations of successively higher octaves form a *geometric* series, 1 2 8, 2 5 6, 5 1 2, etc. But our sensations of the successive octaval increments of pitch constitute an *arithmetic* series having equal differences between its terms, and as such proportioned to the logarithms of the series of stimuli. Now if the velocity of each wave when reduced to zero is transformed by integration into a durational quality determined in its nature by the reciprocal of the velocity, and in its degree by the logarithm of the velocity, then the frequency of the waves themselves or the velocity of their succession, will be analogously transformed by integration into a specific quality of being or duration, measured in its degree by the logarithm of the frequency, and modifying, or *inhering in*, the original quality.

There are several other peculiar characters of sensations and sensation-differences which could be interpreted in terms of our hypothesis that they are modes of anergy or durational being which make their appearance whenever energy is transformed from a kinetic to a potential phase. For example, whether a sensory quality will appear as primarily spatial like colour, or as primarily temporal like sound, should be determined not as in the case of intensity by the velocity of the stimulus wave multiplied by a mass factor, but by the length of time which was necessary to absorb the wave. This is very

long in the case of sound and very short in the case of light, hence the former appears as an essentially temporal thing and the latter as essentially spatial or extended.

The modes of energy which are produced by the modes of energy of the stimuli will have two sets of properties, the one set relative, continuous, and quantitative, the other absolute, discontinuous, and qualitative. The first set will be determined directly by the relations of the stimuli to one another and to the system as a whole, and only indirectly by the character of each stimulus. These will be the so-called "primary" qualities of size, shape and position, and of date and duration. The other set of characters will be determined directly by the intrinsic character of each stimulus, and only indirectly by the relation of the stimuli to one another. These will be the so-called "secondary" qualities, the specific and incommensurable modalities of touch, sight, hearing, taste and smell. Each neural stimulus has what may be called an intrinsic form or pattern constituted by the inter-relations of its velocity, its duration, and its acceleration. Where this complex of measurable properties of an energy or motion is transformed into energy or duration it ceases to be a quantitative complex and becomes a single unanalysable incommensurable specificity. The primarily extensive quantity of motion has become a primarily intensive quality of being. This change from energy into energy is a change of the spatio-temporal into the temporo-spatial. If a motion were infinitely fast it would fill many places at a single instant and could be called "matter." If a sensation were infinitely enduring it would fill many moments of time at a single point, and could be called "substance." As it is, motion has only specious extension, and sensations have only specious duration or specious presentness. Thus motion and sensation are partly substantive and partly adjectival. Each can be treated as a self-identical magnitude capable of being conserved and discriminated, but each needs something more substantive than itself in which to

inhere. There could be no motion that was not the motion of an extended object and no sensation that was not the sensation of an enduring subject.

Now just as the form of a motion is, as such, independent of the amount of its mass-factor, so the form of a sensation is, as such, independent of its intensity-factor. The kinetic energy of the nerve current that passes into a potential form when a sensation is produced, begins at once to pass back into the kinetic energy of the motor nerve currents of reaction; and as it thus passes out and away, the intensity of the sensation dependent upon it fades towards zero, leaving the energy-form as a clear sensory trace. The clearness of these sensory traces is independent of the infinitesimal and ever diminishing intensities which they retain as the correlates of the infinitesimal and ever diminishing remnants of the potential energies of the stimuli correlated with them. These energy-forms are of course our memory images. They sum up at each present instant a succession of past happenings, and constitute an organic system of modifications of whatever it is in the cerebrum that is susceptible of bearing an intensive hierarchy of superposed stresses and strains.

If consciousness is identical with the forms of energy and their correlated traces of potential energy stored up in the brain, why is it that the brain is not conscious during sleep? And why is it that we are only conscious when kinetic nerve currents are flowing over the sensori-motor arc? It would seem that if consciousness is to be identified with anything in the brain, it should be identified with the active rather than the quiescent cerebral condition. I should attempt to meet this seeming difficulty in the following way.

There may exist many systems of potential energy, or of forces and super-forces, in one material body; and these systems may be relatively insulated from one another. The system of traces of potential energy that controls the action of the body during waking life includes only so many of the



stored-up anergy-traces in the brain as happen to be associated with the sensori-motor currents more intimately than with the rest of the brain-traces. Therefore the consciousness of our waking life at any instant includes only those of our memories which are associated more intimately with present sensations than with the rest of our memories. We can think of the totality of the brain's energy-forms as divided into two fields or realms. One set of traces will be tending to discharge towards the sensori-motor arc. The rest will be tending to discharge more towards one another than towards the sensori-motor arc. What I call "my consciousness" at any one moment will be the equivalent of the more intense of these two systems. Now the potential energy produced by the redirection of a present efferent nerve current will usually be stronger than the energies that form the residual potentials of past nerve currents. Hence "my consciousness" or the dominant psychic condition of my brain will usually if not always consist of those ideas which are grouped around a nucleus of present sensation. And set over against it will be the broader and fainter system, the affinity of whose elements for one another is stronger than their affinity for the elements of the first system. This latter system would constitute the sub-conscious. Let me try to make this clearer by a hydraulic analogy. Consider a lake formed by damming a stream. The stream is flowing into the lake, and there is a leak in the middle of the dam almost but not quite large enough to let out as much water as flows in, with the result that the lake grows slowly larger. Now to these natural conditions let us add a circumstance somewhat artificial; let us suppose that there is a certain strong force of attraction between the water of the lake and the containing shores. Then in such a situation we should find the particles of the water tending to divide into two rival systems. The water in the immediate neighbourhood of the stream flowing through the lake would have a bias or tendency to flow with it through the outlet, while the water in

the immediate vicinity of the shores would have by supposition a bias or tendency towards the shores, that was stronger than the suction tendency of the stream. Where the line between the two fields fell would of course depend upon the relative strength of the suction force of the stream, and the counter attraction of the shores. Each field of stress would have a unity of its own. Now for the water of the lake substitute the sensorially accumulated energy in the brain; for the stream flowing through the lake substitute the sensori-motor stream of neural currents that flows through the brain during waking moments; and for the attraction of the shores of the lake substitute the attraction of the energy-forms for one another (the nature of which is expressed in the psychological laws of association) and we shall have a fair picture of that characteristic of our cerebral apparatus that is responsible for the fact that in waking life the dominant or controlling consciousness will contain in its unified field of attention only a certain small part of the wealth of the psychic reality which the brain contains. In our analogy, sleep would be represented by a partial, and trance or swoon by a total, closure of the gates of ingress and egress of the lake. In that situation the self would cease to be divided into a conscious and a sub-conscious system, and there would ensue a single super-sensory experience over whose mighty array of objects the lines of attention (which have their correlates in the lines of stress) would be uniformly dispersed. But the little rill of sensory waking consciousness which is all of the mind that any of us knows directly would (except perhaps in the case of the mystics) be completely amnasic with respect to any such subliminal revelation.

In concluding this last section of our discussion I should like to say just a word as to the bearing of our hypothesis upon the three great questions of traditional philosophy—the Freedom of the Will, the Immortality of the Soul, and the Existence of God. Is a definitely negative answer to each of these questions implied by the ultra-materialistic conception of

consciousness as anergy which we have defended? I believe that this is by no means the case. It seems to me rather that while the theory in question does not in itself commit us either to an affirmative or a negative position with respect to these problems, it does make it possible to formulate them with rather more definiteness than is customary.

Whether the will is free becomes the question as to whether that in the brain which is the bearer of the modes of actual anergy and of potential energy possesses in itself a power of spontaneous and indeterminate activity.

Whether the soul is immortal becomes the question as to whether the system of psychic traces or super-forces can continue to exist, perhaps as a specific deformation or individualized field of strain in the ether, apart from the matrix of material particles which have conditioned its origin and growth.

Whether there exists a God or a cosmic mind becomes the question as to whether the total system of physical energies and forces making up the universe possesses the kind of unity which when found in the human brain expresses an individual consciousness.

While the theory itself in spite of its radical materialism permits, as we have said, either an affirmative or negative answer to all three of these questions, I personally believe, for reasons not stated in this paper, that the affirmative answers are in each case correct. For it seems to me improbable that there could be a continuous and determinate interchange of energies by secondary causality throughout the world unless each real element of the world possessed a spark of primary causality, *i.e.*, of free and spontaneous activity. And it seems equally improbable that the curious intensive hierarchy of super-forces, which embody the present traces of the past, and which constitute vital systems, could be entirely dependent upon the groups of atoms which encase them; and finally, it seems to me improbable, in view of the omnipresence of uniform laws, that the universe as a whole should lack the degree of unity

which we discover in those parts of it that are embodied in protoplasm.

### *Conclusion.*

In the first section of this paper we considered the vitalist challenge to the mechanists to explain in physical terms the origin of those useful variations which arise in the germ-plasm with a greater frequency than could be expected if they were the product of the blind or merely mechanical agencies recognised in physics and chemistry. We attempted to meet the challenge by means of the conception of biological vectors, according to which all of the unpurposed yet purposeful products of telogenesis, not only in the germ-plasm but in the brain when occupied with creative imagination, can be explained as the result of a system of protoplasmic stresses, and, as such, felicitously expressive in their novelty and pertinence of the whole from which they originate.

In the second section of the paper we dealt with the vitalist challenge to the mechanist to explain without the aid of extra-physical categories how the minute germ-cell could be the bearer of a manifold of hereditary determinants involving thousands or millions of ancestral generations in the past, and capable of teleological development into a duplicate of the organism from which it came. We attempted to meet the challenge by conceiving of the germ as a system of superforces or superimposed stresses definable in mechanical terms yet embodying a manifold of invisible intensive determinants equal in richness to the serial events of its ancestral past and capable of unfolding and reproducing its own pattern by a kind of induction through the serial stages of embryonic growth.

Lastly, in the third section of our discussion, we have endeavoured to meet the vitalist challenge to explain mind in physical terms by the suggestion that the structure of conscious life is analogous to the structure of life in general and capable of being explained in the same way, except that

the system of cerebral super-forces in which the past is stored up in the present, is composed of traces of potential energy acquired by the brain through the transformation of the kinetic energies of sensory nerve currents. And as a basis for a physical interpretation of the essentially specific and qualitative nature of mental elements we suggested the new category of "anergy" as a form of durational being inevitably produced whenever the energy of motion was transformed into the invisible phase which we call potential.

Our theory agreed with vitalism and interactionism in recognizing the genuine efficacy in nature of telogenesis, teleology and consciousness; but it agreed also with mechanism and parallelism in refusing to admit the existence of any factor not definable in physical terms. Consciousness is not, as Santayana puts it, "a lyric cry"; nor is it an otiose and epiphenomenal spectator of bodily doings. Our minds are imbedded in the matter of our brains and they play a real part in the economy of nature. It is just because of the physical reality of our minds that we can transcend the mechanical contacts of the *here* and *now*, and, through memory and imagination, adjust our behaviour not only to an environment extending indefinitely in space and time, but also to that Platonic realm of logical and ethical ideals which are independent of the vicissitudes of time and existence.



*Meeting of the Aristotelian Society at 21, Gower Street, London,  
W.C. 1, on January 3rd, 1921, at 8 p.m.*

### III.—THE NEW MATERIALISM.

*By C. A. RICHARDSON.*

THERE is a principle inherent in human mentality, a principle the existence of which most of us have realized in particular instances and in a vague sort of way, but which has only recently been brought clearly to light as one of the fundamental factors in the determination of human activity. The psycho-analysts, to whom its explicit recognition is mainly due, have called it the "ambivalence of the emotions." Briefly, it consists in the fact that there is always a tendency for a strong emotion or desire, referred to a particular object, to turn into its polar opposite. The comparative ease with which intense love may be converted into bitterest hate is perhaps the most familiar instance of this. Possibly the root of the matter is to be found in the more or less unconscious "resistance" which we develop against anything which appears to curtail our liberty by exercising a strong influence over our actions. This resistance is apparent even when the influence is due to an intense emotion or desire of our own.

It has been said that a man's philosophy, reason he never so acutely, is ultimately determined by his desires. If we remember this, it will be apparent that the principle of ambivalence is the source of the main cleavage between the schools, and the consequent strife of systems. For the most deeply marked fissure of all between different schools of thought is not that between Pluralism and Singularism, nor yet that between Realism and Idealism—it is the gulf between Spiritualism and Materialism. All systems may be called by one of those two names, for all favour in a more or less well-marked degree the ultimate supremacy of something that may fairly be called "spiritual" or of something that may fairly be called "material." Nor is the reason for this far to seek.

Spiritualism, not in a narrow, but in its most general sense, is the belief bound up with man's deepest and most impelling desires. If it be thoroughgoing it carries with it the belief in freedom, the hope of immortality, the promise of the ultimate triumph of the Good. Thoroughgoing materialism is the negation of all these. In the adherence of men either to the one or to the other of these two great creeds, we see the principle of ambivalence in what is perhaps its most striking manifestation, for it is common knowledge that the fervour of the champions of Spiritualism is only equalled by the bitterness of their opponents. This bitterness is the hallmark of what, following the psycho-analysts, I have called "resistance." The ardent materialist feels, whether consciously or unconsciously, the drive of those great primal longings, no less than does the ordinary mortal, but he resents their influence—he will turn the cold light of remorseless reason on these spiritual fantasies, and dissipate them as the springing breeze scatters the morning mist. Yet he forgets that his attitude is but the negative aspect of those very desires he is endeavouring to crush, and is itself the outcome of a resistance which consists in impulses comparable strength for strength with those of his somewhat despised antagonist.

The fact that belief is largely determined by desire is, however, no argument against the examination of belief in the light of reason. Accordingly, it is my present purpose to discuss rationally, so far as may be, what I have called "The New Materialism." I call it this to distinguish it (for it is in fact so distinguished in certain important ways) from the older type of materialism. Materialism, for the reasons given above, is always with us in some form, but this form is subject to variation. The older materialism reached its climax, and, we may add, I think, its downfall, in the latter half of the last century. During that period its influence, backed by the triumphs of physical science and by the misinterpreted Darwinian theory, was profound. It still claims a certain

number of adherents, but these constitute a force of no appreciable effect in the philosophic world, being made up, for the most part, of scientists with little or no philosophical training, which, indeed, they affect to despise, dubbing it "metaphysical" and imagining that thereby they have disposed of it for ever.

On the other hand, a new form of materialism has gradually been developing (though its exponents might not at first recognize themselves under the name of "materialists") which constitutes a very real and powerful force indeed. It differs from the older materialism mainly with regard to the position in which it draws the dividing line between "mind" and "matter." The materialism of last century, though by no means lacking in self-confidence, did on occasions display a certain lurking uneasiness as regards the nature and status of mind. Usually it adopted one of two alternatives. Sometimes it tried to gloss over the whole difficulty—pretending, in fact, that it really did not exist—by describing consciousness as "a function of the ganglionic cells of the cerebral cortex" or by some other equally high-sounding catch-phrase which, in such a context, meant precisely nothing. At other times it deigned to raise mind one step higher by granting it an "epiphenomenal" existence as an accompaniment of bodily processes, thus committing itself to a sort of one-sided dualism. But, in any case, materialists agreed in regarding mind as somehow the "product" of the body, and with this pleasantly vague assertion they were generally content (perhaps wisely) to stop. However, the main point that concerns us here is that the older materialists included in the category "mental" not only images, concepts, and volitions, but *sensu-data* also. In other words, they regarded as mental the whole objective content of an individual experience. For them the ultimate realities from which all else was derived were material entities *outside experience* (incapable, indeed, of being experienced), namely, the atoms and molecules postulated by



the chemist and the physicist. The fact that the qualities attributed to these material particles in defining them were of precisely the same type, carried to a limit, as those perceived in sense-data, was entirely ignored; nor, as a matter of fact, could any further, and necessarily unknown, quality be added to them without the danger of destroying their character as *material*. Thus the dividing line between mind and matter was laid down as coincident with the boundary which separates experience from whatever is beyond experience.

The new materialism can hardly be said as yet to be a theory definitely adopted by a distinct school of thinkers. Rather is it a strongly marked trend in the theories put forward by a number of well-known writers, representative of different, though in many respects closely allied, schools. Its main characteristic is the position it assigns to sense-data. It has long since been realized that a theory which regards the atoms and molecules defined by the physicist as the true realities of which sense-data are somehow the rather unsubstantial and often illusory effects, will not work. Two obstacles stand in the way—obstacles which such a theory can never surmount. These are the problem of the knowledge of the external world, and the problem of the relation of mind and body. Consideration of difficulties of this kind has resulted in the recognition of the fact that the actual concrete realities are those given in perceptual experience, namely "sense-data," which in their spatial and temporal interrelations constitute "events." Whether we make sense-data or events the more fundamental depends on the particular way in which we choose to analyse the content of experience. However that may be, the chief point is that the statements of science about molecules, atoms, and electrons—these being apparently substantial entities distinct from sense-data—turn out to be (indeed, must necessarily be) immensely condensed assertions about sense-data themselves. In other words, the "material" of the new materialism is not constituted by hypothetical entities outside experience, but by

entities which enter into experience, namely sense-data. The latter are no longer regarded as mental, but as physical.

It may be objected that it is not fair to label the exponents of these new theories "materialists." Whether it is fair or not will depend upon the position they assign to mind or spirit. To the spiritualist the realm of mind is constituted by what he calls "selves" or, better, "subjects," namely, the individuals who *perceive* sense-data. What attitude do the new prophets adopt on this matter? Unfortunately, there is a regrettable absence of conclusive argument, and even of anything like stability of position, in their writings. But the main trend of their thought is clear. They are out to get rid of mind altogether from the scheme of things, and on occasion they proclaim it with no uncertain voice, though they do little more than issue the proclamation. They contend that the self or subject has no concrete existence. At most it is the series of sense-data, images, etc., which constitutes the content of the individual experiences; and sense-data, at any rate, are physical, that is, material. Thus, so far as knowledge or experience goes, the material is supreme, for, in fact, mind is non-existent. It is for this reason that I call the upholders of the new theory "materialists."

We find the influence of the new materialism in both philosophy and psychology. In philosophy it is most marked amongst the Neo-realists; in psychology amongst the Behaviourists. Neo-realism, following the lead of Mr. Bertrand Russell, is rapidly moving towards the position that a "subject" is nothing but the series of those particulars which would formerly have been said to stand in a relation of presentation to the subject, the latter being no longer regarded as a *concrete* metaphysical entity, but simply as a class of particulars, *i.e.*, as an abstraction. As for Behaviourism, it would not be in place to consider it in detail here. Suffice it to say that it seems to be confronted by a simple dilemma. If it sticks consistently to its standpoint, it can know nothing whatever of the existence

of such processes as imagination, thought, or even perception. If, on the other hand, it admits the existence of these, what right has it arbitrarily to rule them out of the subject-matter of psychology—they were the *original* subject-matter of that science—simply because it cannot reach them by its own method? Cannot reach them, I say, for peer as you may into the recesses of a man's brain, you will never catch one glimmer of the sensations and images which flit through his consciousness. Behaviourists seem, whether consciously or unconsciously, to be awakening to the presence of this dilemma, and to be making up their minds to go the whole hog by denying the existence, as such, of perception, imagination, thought—in a word, of mind. But how then does the behaviourist know anything about his own behaviour or that of anything else?

It is a curious and distressing fact that, even after the lapse of thousands of years of speculation and argument, philosophers are not yet agreed among themselves as to whether they and their fellow-men really exist as individual spiritual entities or not. It is high time that the matter was thoroughly threshed out and a common platform agreed upon. For it is a point deeply affecting the progress of philosophy. It is the business of the philosopher to frame hypotheses as to the nature of reality; but before he can do so he must come to some conclusion in regard to the types of concrete existents he can take for granted as real beings, in terms of which to express his hypotheses. For example, is he to be limited to sense-data, or "sensibilia," as we had better name them to avoid any question-begging, or may he also include in his hypotheses "subjects" who perceive sensibilia? The new materialism would reply that ultimately he must cut out the latter, for they can be shown to be constructions built up of sensibilia and the other kinds of particulars, such as images, for example, which make up what we may call the "objective" side of experience. Incidentally, a curious point arises here, for according to this

account, the group of particulars (though a logical abstraction apart from the actual particulars themselves) appears itself to "construct" or "abstract" the idea of itself as a substantial entity, this idea then being, of course, necessarily one of the particulars which constitute the group. We need not dwell on this point, but it is at least sufficient to show that the whole position needs some examination.

There are then two allied questions at issue. Firstly: Are there subjects as well as sensibilia? Secondly: If so, is the being of sensibilia independent of the perception of them by a subject? Evidently the first question calls for prior consideration, and in considering it a point of primary importance is at once apparent, namely that sense-data, etc., occur in definite individual series or groups, these being the contents of different individual experiences. But how does the knowledge that sense-data occur in groups of this kind arise? Unless we postulate a subject who perceives the sense-data we are compelled to regard the latter as being aware of themselves and of their existence as a group. Philosophers in the past, as well as at the present day, have frequently had recourse to such an alternative. Yet, *prima facie*, nothing seems clearer than that in the perception of (say) a red patch, the awareness is not situated in the patch, but in something which in reflection we can distinguish from the patch. However that may be, the broad question at issue is this: Is there any real distinction between the series of sense-data, etc., and the series of *experiences*, or are they simply different names for the same thing? In other words is there any distinction between a sense-datum and the perception of a sense-datum? It is to this crucial question that the Neo-realists have failed to give a satisfactory answer. Indeed, one cannot pin them down to a definite answer at all. They appear to incline to the belief that there is merely the series of sense-data, etc.; yet on the other hand they talk about sense-data being independent of perception, which clearly implies a distinction between a sense-datum and the perception

of it. If this be admitted, however, the whole question of the existence of the subject is raised over again.

Certain Neo-realists have endeavoured to evade the difficulty by following Mach and James in regarding reality as made up of elements which, if taken in one type of arrangement or context, are psychical, while if taken in another, are physical. "Minds" are thus looked upon as "cross-sections" of reality taken in a particular way. But if reality consisted simply of such a collection of elements, any cross-sections of the kind supposed would be merely potential, not actual. They could not be actual without some concrete basis for the division additional to the mere collection of elements. Yet they are in fact actual, for sense-data *do* occur in individual series. Hence the theory cannot dispense with something over and above the mere series. Moreover, it does not really escape the objection mentioned at the end of the previous paragraph, for it does not make clear what it means by the perception of an object, but begs the question by using the terms "psychical" and "physical" as mere labels, without indicating the basis of the distinction between them.

I am inclined to think that the real root of the difficulty which Neo-realists seem to find in admitting the existence of the subject, is the fact that the latter cannot be an object of acquaintance in the way that a sense-datum can be an object of acquaintance. This difficulty is, I think, implied in all the neo-realist arguments on this point, and in some cases seems to be stated explicitly. "If we examine the content of our experience" (they say, in effect) "we do not find anything corresponding to the idea of a subject. Therefore let us dispense with that idea." By all means let us dispense with it if we can get on without it. Unfortunately, however, we cannot get on without it for reasons such as those previously pointed out; and, incidentally, we have to assume it in the very attempt to dispense with it. But, quite apart from these considerations, I utterly fail to understand the deep importance

which Neo-realists appear to attach to this argument. Of course I cannot *find* the subject in the content of my experience, for I *am* the subject. Yet why should this preclude me from being aware of my own existence? On the contrary, it seems to me to imply an order of certainty at least equal (though on different grounds) to my certainty of the existence of the sense-data I perceive. I am *acquainted* with sense-data; I *realize* (as I have expressed it elsewhere) my own existence. This term "realize" is the nearest I can get to a satisfactory expression of that indubitable awareness of one's own existence which is implied in self-identity. If I do not misunderstand him, the term is practically synonymous with the word "enjoy" as used by Professor Alexander. In any case, whatever term we use, the fact which it expresses seems to me to be the most intimate, immediate, and concrete fact in the experience of every individual, and it is just because of this, perhaps, and because we cannot get outside of it (so to speak) and examine it, that we are frequently apt to overlook it altogether. Experience is wider than acquaintance, and although we cannot be acquainted with ourselves, we can have knowledge about ourselves, for such knowledge may spring from what I have called "realization," and not, as has sometimes been supposed, necessarily and in every case from acquaintance alone.

For the reasons thus briefly outlined, it would seem that the philosopher is fully justified in making use of those entities we call "subjects" in framing his hypotheses about the nature of reality. Moreover, once he is enabled thus to employ them, he finds himself in possession of an explanatory principle unequalled and, indeed, quite unique in its solvent power so far as many of the long-standing difficulties of metaphysics are concerned. The great trouble as regards metaphysical problems arises from the peculiarly ultimate nature of the matters with which they deal. Thought is here at closest grips with actual concrete reality, and for that very reason the solutions of the problems to which reflection gives rise defy statement in words. Such statement

is inevitably abstract in nature and, therefore, cannot comprehend the uniqueness of the concrete. The alternative is to look round for a case in which the solution of the particular problem we are attacking is, not abstractly *stated*, but concretely *realized*. For example, consider the problems of Substance, Permanence, and Change. What is a substance, and how is its permanence reconciled with the change of its states? Sense-data will not help us here. It is true that sense-data frequently endure for a time apparently unchanged, and that change in them, when it occurs, is continuous; but, eventually, complete alteration ensues. In this case we simply have temporary fixity *plus* gradual change and not *given* entities which endure permanently while at the same time they exhibit changing states which are also given. There is no true reconciliation of permanence and change here. But the case is far otherwise when we introduce the notion of the "subject." For the subject would seem to be the very type and pattern of what may be called substantial or concrete existence. For surely by a "concrete existent" we can only mean an entity which is something *in and for* itself—something with a nature which cannot be fully grasped or apprehended by any other entity, but which has to be "lived" or "realized" to be understood—something which is not a mere "externality," but which has a certain "inwardness." Words, of course, must fail here, and recourse to metaphors and analogies is inevitable, though unsatisfactory. But the point I am trying to make is that those very ideas which we grope after in endeavouring to express what we mean by "substance," and which we cannot put into words, are actually realized by each one of us in his own nature as a subject. Moreover, although we cannot *say* how the two characteristics of change and permanence are reconciled, we yet realize that reconciliation concretely in ourselves. Doubtless it was such considerations as these which led Lotze to identify substances with subjects.

What, then, of sense-data? For these, as such, are entirely

lacking in that essential characteristic of subjective beings which I have indicated by the term "inwardness." This very lack is, indeed, implied in the fact that we can be *acquainted* with them, and in view of it I think we are bound to regard them as of a different order of being from that of subjects. The distinction between the two orders of being is precisely that between the noumenal and the phenomenal. This distinction has fallen somewhat into disrepute owing to the tendency of modern philosophers to confine themselves to the objective side of experience, while ignoring or denying the existence of the subject. We can find no warrant in the object of experience for the distinction between phenomenal and noumenal, but so soon as we admit the subject as a factor in our theories, the distinction is seen to be a truly valid one; for, as I have pointed out, the subject is characterized by that unique being in and for self, which is the essential mark of the noumenon. Accordingly, I should prefer to confine the term "existence" to subjective (*i.e.*, substantial) being, denoting the phenomenal being of sense-data by some other term, such as "appearance." This would not mean that sense-data were unreal. The antithesis between appearance and reality is not a truly valid one, for an appearance is real. The true antithesis is between appearance and existence, as I have defined the terms.

Most people would be willing to admit that we may reasonably assume that *some* phenomena, at least, are the appearances of other beings like ourselves. For the thorough-going spiritualist, however, *all* phenomena are the appearances of spiritual beings, *i.e.*, subjects, and his hypothesis is immensely strengthened if subjective being can be identified with substantial existence. Whether this identity is complete—and I think there are strong reasons, as I have tried to show, for believing that it is—or whether subjective being is but one type of substantial existence, it is evident that it is in the essential difference between the modes of being of subjects and



of sense-data that the fundamental supremacy of the spiritual over the material ultimately consists.

We may now pass on to the second of the fundamental questions we are considering, namely, the question whether sense-data, as regards their being, are independent of perception. Materialism, in its modern form, will receive a shrewd blow if it can be shown that the being of sense-data depends, at least in part, upon their being perceived. This issue has been raised anew of late years in a crucial form by the Neo-realists. The Berkeleian view, supported by powerful arguments which have perhaps never been entirely refuted, is that the *esse* of objects is *presentiri*—apart from being presented they have no being at all. The Neo-realists strongly oppose this view. According to them, the sense-data we perceive can and do exist when not being perceived, entering quite casually into the relation of presentation while maintaining their substantive entity quite independently of it. To such objects the name "sensibilia" has been given, a "sense-datum" thus being a perceived sensible. The Neo-realists do not seem to be quite so certain in their minds as to the status of objects of the nature of dreams and images, though it would appear that their theory must logically compel them to admit the existence of images which nobody imagines, and dreams which nobody dreams. The thought of these ownerless fantasies drifting about in the void, and occasionally brought to anchor by the presentational grapnel only to break loose from their moorings again, is a little quaint, and hardly to be credited with giving intellectual satisfaction; and the arguments of the Neo-realists in support of their theory are not very convincing, as will shortly appear.

Now there are two questions involved here, which are apt to be confused. The first is: Are there any entities at all which are not perceived? The second is: Are there any unperceived entities which are essentially akin to those which are perceived, namely, sense-data?

To the first question we may reply at once that there is no reason whatever to suppose that there are no entities of any type which are not perceived. As we have already seen, we know of at least one type of unperceived entities, namely, subjects, and it is obvious that there *may* be an indefinite number of entities which never will and never can form part of an object of experience. But to the second question, where the type of entity considered is definitely fixed, namely unperceived sensibilia, the reply calls for fuller investigation.

It is necessary at this point to be very careful in the use of terms. One example will make this clear. If we see a circular yellow patch, we may perhaps, say: "This sense-datum is yellow and circular." But it must be clearly borne in mind that there is no assertion here as to the existence of something (the sense-datum) in addition to the yellowness and circularity, and of which these are qualities. The sense-datum simply *is* the the circular yellowness and nothing more, and the statement "This sense-datum is yellow and circular" is just a way of putting the matter, which may for some purposes be more convenient than the more strictly accurate "There is a circular yellowness."

After this initial warning, it may now be asked what exactly is meant by saying that anything is "essentially akin" to a sense-datum. In other words, what is the *essence* of a sense-datum, *i.e.*, what is the feature or features which all sense-data have in common? Now at first sight it might appear that there are three: extensity, intensity, and protensity or duration. But it soon becomes evident that this will hold only so long as we consider sense-data of one type. *E.g.*, it is easy to recognize the similarity between any two visual sense-data, or between any two tactual sense-data, in virtue of the common property of extensity which they possess. The case is entirely altered however, when one of the sense-data is visual and the other tactual, for then the extensities are qualitatively quite different. The use of the same word "extensity" in application to both

has a significance which is purely abstract; it does not mark any *concrete* similarity of essence between the sense-data. Similar remarks apply to intensity and protensity; so long as we confine our attention to the sense-data as such, without reference to the subject perceiving them. Whether such a course is ultimately justifiable is not here the point, for by adopting it temporarily we are simply meeting the Neo-realists on their own ground.

So far, then, we have not discovered any feature which forms part of the concrete essence of *all* sense-data. One fact, however, has not yet been considered, namely, that peculiarity of sense-data which may be variously expressed as "givenness" or "immediacy," in virtue of which they *are* data. Here, indeed, is something common to them all, but it is the very thing which by definition cannot be predicated of unperceived sensibilia. Thus the question we have to settle is whether this "givenness" is really part of the essential nature of sense-data, or whether, as the Neo-realists contend, it is merely a way of saying that the latter stand, more or less accidentally as it were, as terms in the presentational relation, this fact having no bearing on their essential nature. Actual experience would seem, perhaps, to favour the former alternative, for this peculiarity of sense-data certainly appears to be located in themselves. This alone, however, is far from being convincing, and we must accordingly try to come to a decision on other and more strictly logical grounds.

At this stage let us refer back for a moment to a preceding point in our discussion, namely, the nature of our relations with other existents. It was remarked that existents, as they actually are in themselves, could never be immediate data of perception. We can never be immediately acquainted with other existents as they actually are in their inmost nature. To use a spatial metaphor, we are necessarily "external" to them in a sense. We cannot realize their actuality without *being* them. But they may perhaps influence us so that we are

immediately aware of something of which they are the ground, and which may appropriately be termed their "appearance" to us. In other words, as previously pointed out, the distinction between "noumenon" and "phenomenon" is a legitimate one—it is the distinction between the individual entity as it actually is in itself and the appearance it presents to a percipient. The one point that here concerns us is that the phenomenon depends for its being on the percipient as well as on the existence of the noumenon of which it is the appearance. An appearance must be an appearance *to* someone, as well as *of* something. It follows that the "immediacy" or "givenness" of sense-data is part of their essential nature, and hence there can be no such entities as unperceived sensibilia. Sense-data are of the phenomenal order, and therefore cannot be essentially akin to any unperceived existent, for the latter must necessarily be of the noumenal order.

The foregoing is probably the most direct argument against the existence of unperceived sensibilia, but its conclusion is reinforced by certain other considerations. The first of these depends on the fact that the concept of a sense-datum, though very convenient for many purposes, is really an abstract fiction. For there is no definite, determinate entity which we may indicate and say "This is a sense-datum." In reflective thought we may suppose the presentational field split up more or less arbitrarily into definite separate units termed "sense-data." But in actual sense-experience there is nothing of this. Even if we adopt the standpoint of reflective analysis and proceed to split up the object of sense-experience into parts, it is yet evident that the process of division may be performed in indefinitely various ways. There is no unambiguous set of simple individual particulars to which we may point as constituting *the* sense-data which compose the given presented object. Now this conclusion invalidates the neo-realist theory according to which sense-particulars are definite, self-existent entities independent of perception. The sense-datum is thus a

purely artificial unit, and the analysis which yields it is accordingly only partially adequate.

A somewhat similar line of argument follows from a consideration of the growth of the individual experience. Here the originally vague and simple presented unity is gradually moulded by continuous differentiation and redintegration into a clearer but more complex form. A particular example of this occurs when we are suddenly confronted by an entirely novel scene. Our first vague perceptions are gradually cleared up by never-ceasing movements of discriminative attention. How is the neo-realist theory to account for such a clearing up of the presentational field? On the theory that sense-particulars are definite independent existents, we should have to suppose that only some members of the set of sensibilia constituting the scene before the subject are at first perceived, the remainder being noticed one by one. The object of experience would then consist of a patchwork made up of isolated sense-data and blanks, the latter being gradually filled in. Nothing, however, is further from actuality. To begin with, by the very nature of the case, there cannot be such a thing as a literal "blank" in the presented object—a "blank" cannot be presented, nor can a presentation be a "blank" without involving a contradiction in terms. Moreover, we do not find that a novel presentation consists of an increasing number of distinctly perceived parts, each of the latter passing abruptly from non-existence to distinct perception and thereafter remaining distinctly perceived—for, be it noted, if sensibilia be independent existents, their nature being independent of perception and identical with what they are *known as* (all of which the Neo-realists maintain) it follows that there can be no valid difference between distinct and indistinct perception, the sensibilia are just perceived as they are and that ends the matter. However, what in fact we *do* find is a very different state of affairs. Throughout it is a *unity* which is perceived, at first of the type we call "vague" or "indistinct," gradually

changing to the type we call "distinct." Each modification is actually a modification of the unity, and not of any supposed part of it.

We may conclude from the preceding arguments, therefore, that there are no entities essentially resembling sense-data yet unperceived. The object of experience, like the subject, is thus dependent for its being on the fact of presentation. But before passing on to our final topic, it may be well to consider briefly the direct arguments urged by Neo-realists and allied thinkers in favour of the independence of sense-data. These reduce fundamentally to the following line of procedure: The various types of dependence are defined, and it is then shown that the presentational relation cannot be included under any of them. The whole argument is vitiated, however, by ignorance of the uniqueness of the presentational relation and the consequent impossibility of subsuming it under a specific type. In other words, the conclusion aimed at (the independence of sense-data) is implicitly asserted in the major premise, which is false. Thus the main cases of dependence of  $A$  on  $B$  are defined as occurring when: (1)  $A$  contains  $B$ ; (2)  $A$  is the cause or the effect of  $B$  in a system exclusively determining  $A$ ; (3)  $A$  implies  $B$ ; (4)  $A$  is implied exclusively by  $B$ . Evidently, presentation is excluded from these types by their very definition, so that the Neo-realists have no difficulty in proving the desired conclusion. But what guarantee have we that these are the only types of dependence? The whole method is faulty. What is really required is an absolutely general criterion of dependence. When this has been decided on, and not before, we may begin to inquire as to the dependence or independence involved in the unique presentational relation. Now the above four types of dependence refer to different kinds of things: (1) refers to classes; (2) to events; (3) and (4) to propositions. I think there is a common element present in all four cases, though it is not easy to find a general term to describe it. Perhaps "concomitance" (with

the reservation shortly to be specified) is the best word for the purpose. Concomitance would therefore appear to be the most general criterion of dependence that can be devised. For we might define this criterion in some such way as the following: If A be something of a given type and B another thing of the same type, and if A is an invariable concomitant of B *in the sense appropriate to its particular type*, then A is dependent on B. Evidently "concomitance" must be interpreted according to type. Thus, in the case of propositions, for example, it carries with it implicative dependence; in the case of events, causal dependence. Now I have pointed out reasons for believing, from a consideration of the nature of presentation, that sensibilia never exist without being perceived. In other words, there is probably in the case of the *esse* and the *principi* of sensibilia a special type of concomitance which, in accordance with our criterion, involves the dependence of one upon the other. At least there is nothing in the Neo-realist theory of dependence described above, which has any direct bearing on the matter, for it clearly begs the whole question.

The truth of the matter is that the Neo-realist theory entirely fails to take account of the implications of the fact that sensation is a *process*. Of late years philosophers have been repeatedly urged to be careful to distinguish, in considering sensation, between the act of sensing and the datum sensed. Continual insistence upon this has finally led many people to lose sight of the fact that although, for many purposes, it may be necessary and legitimate to consider act and datum in abstraction from one another, yet this has no bearing on the question of the actual existential separability of the two factors. We must not forget that what the Neo-realists call "sense-data" are really the *determinate contents* of acts of sensing, and therefore inseparable from the latter, which would otherwise be mere blanks. We have a certain analogy for example in the case of the shape and the size of a body. These may be considered in abstraction from one another, and propositions may be truly asserted of the one

which do not involve the other, and hence it is important to distinguish between them, but this does not alter the fact that concretely they are quite inseparable.

There has recently been apparent, I think, an increasing tendency to adopt some such view as I have just indicated. As symptomatic of this tendency I may quote the distinction now drawn by certain philosophers and psychologists between what they call respectively the "content" and the "object" of an act of sensing or perceiving. For instance, in the case of a visual sensation, the patch of colour is the "content," while the entity of which the patch is the "appearance" (to use the word as I have previously defined it), is the "object." The being of the object is independent of the act of perception, but the being of the content is not. To me, this view appears sound, though I do not think the term "object" is a particularly happy one to use in this connexion.

Sensation, then, is a process. But in what does the process actually consist? I should reply that it consists in the determinate activity of the subject of experience, activity being something ultimate which is not "found" by observation, but which is "realized," or, to use Professor Alexander's term, "enjoyed," by each one of us. The activity of the subject is, merely as such, formless—a blank. Hence perception is nothing apart from something perceived. But in experience this activity takes on a certain determinate form, and this form is constituted by the content of the experience. In sense-experience the assumption by subjective activity of a determinate form is a consequence of the interaction of the subject with the environing entities, and the particular form assumed is dependent not only on the nature of the subject but on that of the environing entities as well. This last point is an essential feature of the theory here put forward, and saves the latter from degenerating into a subjectivism which finds its only logical end in solipsism. As to the environing entities, the metaphysical spiritualist regards them hypothetically as other subjects or spirits, and endeavours on this basis to



formulate a theory which will interpret and explain the facts without the introduction of entities of an unknown type.

To sum up briefly: The New Materialism takes the form of a denial of anything corresponding to the idea of "mind" or "subject." Its material is not atoms and molecules, but sense-material. Among philosophers its advocates are to be found mainly in the ranks of the Neo-realists. Not only, however, can the subject of experience not be reduced to a series of sense-data, as the Neo-realists argue, but we have, on the other hand, the strongest reasons for regarding the subject as a real metaphysical entity, and, indeed, as the very type of concrete, substantial existence. Moreover, the ontological independence of sense-data, which is another cardinal theory of Neo-realism, is also found to go by the board. Accordingly, the claims of metaphysical spiritualism as a theory of reality are strongly reinforced. Recognizing the reality of the subject of experience as a substantial entity, the spiritualist conceives experience as consisting in spiritual activity. In sense-experience, which is one type of this activity, the content (*i.e.*, the sense-data of Neo-realism) is the particular *form* assumed by the activity, and this form is determined by the interaction between the individual concerned and other spiritual individuals. But the whole matter hinges on the admission of the existence of the subject, and until philosophers are agreed on this point, it will remain a most serious obstacle to the progress of metaphysics; for not only will there be disagreement as to theories—there will also be disagreement on a far more fundamental matter, namely, the entities in terms of which theories may be formulated. A common platform here is the most pressing philosophical need of the day. Without it, philosophy will be left behind, a curious relic,—interesting, but a relic,—by the intuitive wisdom of the vast mass of humanity. There is apparent, even now, abundant and universal manifestation of a more and more resistless turning of mankind to a belief in things spiritual and eternal.

*Meeting of the Aristotelian Society at 21, Gower Street, W.C. 1,  
on February 7th, 1921, at 8 p.m.*

#### IV.—A PLEA FOR A PHENOMENOLOGY OF MEANING.

*By R. F. A. HOERNLÉ.*

§ 1. *The Need for a Phenomenology of Meaning.*—The purpose of this paper, as its title indicates, is a humble one. So far from having a definite theory of meaning to offer, I am only groping towards one. Indeed it is part of my thesis that all current theories of meaning, so far as I am acquainted with them, are, for one reason or another, inadequate. They are either too general to make intelligible the facts in their concrete diversity, or else they are based on some selected group of facts, and thus do not cover the ground. Moreover, they reflect the general philosophical presuppositions of their authors, and as a result they are either simply incommensurable or even actually conflicting. The chaotic terminology which prevails in the theory of meaning is symptomatic. The very term "meaning" is nearly as ambiguous as the term "idea." The need for further study is, therefore, incontestable. It is the chief purpose of this paper to urge that, before constructing further theories, we require more of the humble discipline of patient and exhaustive phenomenology, by which I mean the collection and unprejudiced examination of all types of empirical situations in which signs function, in which meaning is present. It is remarkable that the prominence of signs and symbols in our lives—in religion, in art, in science, in business—has not attracted attention more persistently to this field of inquiry. Yet "brain-work" is eminently sign-work—sign-using, sign-interpreting, if necessary sign-inventing. In every society,

the educated and "governing" classes are mainly symbol-mongers. They deal with realities indirectly. Think of the apparatus of maps, reports, statistics, orders, through which the G.H.Q. of an army in the field conducts operations. Its knowledge of the facts on which its decisions are based comes mostly not at first-hand, but through signs, and through sending out signs it initiates and controls the marching and digging and fighting of the troops. Without signs we should have neither social organizations, nor the systems of science and philosophy, nor religion, nor art. Yet the problem of signs and meanings has been neglected by most philosophers, except when irritation at the ambiguities of language has aroused a passing interest in the functioning of words.

§ 2. *Review of the Literature.*—Having brought against current theories of meaning the accusation of inadequacy, it will rightly be expected of me that I should substantiate my charge. I can do this best by critical comments on a select few, and I shall begin with the theories which were offered at the Oxford Congress\* last September:—

(a) Dr. Schiller's theory that meaning is "essentially an *activity* or *attitude* taken up towards objects by a subject," that it is "personal" and, indeed, "relative to the *whole* personality," seems to me in his presentation of it to suffer from a failure to distinguish between phenomenologically different situations. The theory, in short, is too general: its application to different situations is not worked out. We are told that meaning is all-pervasive; that we look for a meaning in everything that happens to us; that meaning, like value, resembles an "atmosphere" through which all objects are observed. But mixed up with this meaning of objects is much argument about the meaning of words and images. For a phenomenology of meaning, I submit, these are different cases. The interpretation of the meaning of objects and

---

\* See *Mind*, N.S., vol. xxix, No. 116.

events, as I shall try to show below (§ 3), is different from the interpretation of words. There is a corresponding difference in the senses of "expression." A man, I agree, "expresses" his personality in the way he takes the things which happen to him—optimistically or pessimistically, as due to chance or as due to God, as causes and effects or as omens and signs of good or evil spirits. He expresses himself in the meanings he entertains, affirms, acts on. But if his meanings are thus expressive, they are themselves expressed, in another sense of the word "expression," by the signs, verbal or other, which he uses. In Dr. Schiller's remark, "the commonest meaning of 'it is a fine day' is 'let us talk,'" the two senses of meaning and of expression for the distinction of which I am pleading, are very obviously run together. However, the general direction of Dr. Schiller's theory seems to me right. His emphasis on the "standpoint of the agent," of "the person who means," is, as we shall see, a contribution of central importance for the theory of meaning.

(b) Mr. Russell has made various contributions to the problem of meaning which it is far from easy to reconcile with each other. In his Oxford Congress paper and in the relevant passages of his address on *Propositions* before this Society, he appears to have written mainly as a psychologist. On the other hand, in his paper *On Denoting*,\* and in certain passages of his *Introduction to Mathematical Philosophy*, he deals with a rather technical problem of logic. Whether there is any connexion between these two modes of treatment for Mr. Russell, or whether he is conducting his arguments in watertight compartments, remains obscure. The psychological treatment is both phenomenologically too narrow and biased by theoretical preconceptions. It is too narrow, because (a) it restricts itself to the meaning of words and reduces this further to the meaning of images, on the ground that "images resemble

\* Cf. *Mind*, N.S., vol. xiv, No. 56.

what they mean, whereas words, as a rule, do not"; and (b) because it restricts the function of words to that of stimulating us "to act with reference to an object which is not present." The whole context and language of Mr. Russell's theory make it a fair inference that the only type of situation of which he is at the moment thinking, is that in which some sense-datum or image, generally verbal, functions, by association or "mnemic causation," as a cue for appropriate behaviour towards further sense-data to come. But does no scientist ever use language significantly in recording what here and now he, for the first time, observes? Or can any of the language of Mr. Russell's mathematical treatises be brought under his formula? And there are plenty of other negative instances. As for imagery—the view that images are, in last analysis, necessary to meaning has been so often and so completely discredited, that Mr. Russell's attempt to renew it without any reply to its critics, is somewhat surprising.\* Mr. Russell's rejoinders to Dr. Schiller's strictures ignore the main point, viz., that we can and do mean lots of things which no image can possibly "resemble." It is irrelevant to urge that words may function in the place of images once present, now forgotten. What images does, or did, Mr. Russell use for the objects and relations on which he discourses in his books on mathematical logic? The fact is that, alike in selecting his data and in framing his theory, Mr. Russell is dominated by a theoretical bias. Meaning, he postulates, "is an observable property of

\* Some of these arguments are forcibly stated by Dr. Schiller (*loc. cit.*); others were urged years ago by Dr. G. F. Stout in a paper before this Society on *Mr. Bradley's Theory of Judgment* (*Proceedings*, N.S., iii, 1902-3). The fullest discussion of them in English, with special reference to Bradley and James, is still, I venture to think, to be found in my paper on *Image, Idea and Meaning* (*Mind*, N.S., xvi, No. 61, pp. 70-86). The arguments against the image-theory of meaning, as there given, still seem to me sound, though in some other respects I do not now hold either to the language or the doctrine of that paper.—In German, E. Husserl, *Logische Untersuchungen* (2nd Edit.), vol. II, Part 1, ch. 2, §§ 17-20, says briefly and clearly all that is necessary.

observable entities, and must be amenable to scientific treatment," and by "scientific treatment" he appears to mean the analysis of all entities into complexes of sense-data and images, *e.g.*, "sensations and images, suitably related [are] a sufficient stuff out of which to compose beliefs." In the same spirit he defines the "essence of meaning" as lying "in the causal efficacy of that which has meaning," though this definition, as it stands, seems manifestly too wide.

The logical discussion on "denoting" raises, incidentally, one point of phenomenological interest. As will be recalled, the problem concerns proper names or other denoting phrases when they occur in propositions which manifestly have an intelligible meaning, and which may be true or false, whilst yet there exists no real person or thing to whom the proper name belongs or to whom the denoting phrase descriptively refers. To say that the denoting phrase has a meaning but denotes nothing, leads to certain difficulties with which we are not here concerned. To avoid these, Mr. Russell proposes to say that the denoting phrase has *per se* no meaning at all and must be analysed away so that a technically correct expression of the proposition no longer contains it. Now Frege, from whom Mr. Russell differs on this point,\* holds to the view that denoting phrases have a meaning even when there is nothing which they denote, among other reasons because it is only when our interest is cognitive that the existence or non-existence of the denoted object matters, whereas when our interest is aesthetic, the denotation is irrelevant. If we read *Hamlet* as a work of art, not as a work of history, it does not matter whether "the Prince of Denmark" ever existed. But we cannot enjoy the drama, unless "Hamlet" "the Prince of Denmark," *etc.*, have a meaning. Now, it seems clear that if we analyse the denoting phrases in the drama

\* See *Zeitschrift für Philosophie und phil. Kritik*, vol. 100, p. 33. Mr. Russell originally held a closely similar view, cf. *Prin. of Math.*, ch. v.

according to Mr. Russell's prescription, the basis of the æsthetic enjoyment disappears. Meinong's concept of *Annahme* offers the most plausible solution, but unless I am mistaken, even an *Annahme* requires the meaning which Mr. Russell proposes to deny to denoting phrases. This is precisely one of the cases which show the need for a more comprehensive phenomenology.

(c) Lady Welby's *What is Meaning?* and F. Toennies's Welby Prize Essay on *Philosophical Terminology*\* offer little that is directly relevant to a phenomenology, being mainly focussed upon the improvement of language as an instrument for the expression of meanings. Lady Welby would ascribe to every sign three kinds of meaning, *viz.*, sense—meaning—significance, which she correlates respectively with denotation—connotation—suggestion, with signification—intention—ideal value, and even with the instinctive—the volitional—the moral. But these suggestions are not developed or tested, for her interest is not in phenomenology, but in the problem how best to use metaphor and analogy for expressing spiritual truths. From her, however, we may take the hint that one of the most important topics for a phenomenology is the interpretation of sensible signs as expressions or revelations of invisible (non-sensible) realities, be their name mind, spirit, value, or what not. This may serve as a corrective to Mr. Russell's way of narrowing the meaning of signs to "objects not now present," *i.e.*, to objects perceptible but not at the moment actually perceived. We have no right to rule out *ab initio* the possibility that sensibles are signs for supra-sensibles, especially when we all use precisely this relation in our interpretation of bodily gestures and vocal sounds as expressive of mental processes or activities.†

(d) The articles on Sign, Symbol, Sign-making function, Intent, and allied topics in Baldwin's *Dictionary of Philosophy and Psychology* were mostly written by Charles S. Peirce and

---

\* *Mind*, N.S., vol. viii, Nos. 31, 32, vol. ix, No. 33.

† Royce's discussion of interpretation in *The Problem of Christianity* (vol. ii, chs. xi-xiv) is relevant in this connexion.

Dr. G. F. Stout. They are valuable as being the only conveniently accessible source for a study of Peirce's theory.\* To Peirce's definition and classification of signs I shall return below (§ 3). Here it is enough to note, as symptomatic of the terminological chaos, that whilst Peirce defines a "symbol" as a "sign which would lose the character which renders it a sign if there were no interpretant," and cites speech as the most obvious example, Stout contrasts symbols as "substitutive" signs with words as "expressive" signs, on the ground that whilst the latter serve to direct attention to the object signified, it is the explicit function of the former to dispense with attention to the object. In addition, Stout distinguishes three other classes of signs, *viz.*, demonstrative, discriminative, mnemonic, but it would be hard to say to which of these five classes would belong, say, an omen, or an example of plant-signature, or a flag, or a cross, even when we distinguish different sorts of uses of such signs as flags and crosses.† Stout's definition of symbol as a "sign provisionally substituted for the thing symbolized" raises an interesting phenomenological question, *viz.*, whether algebraic symbols are rightly conceived as marks meaningless in themselves, for which yet concrete objects can be substituted in such a way that operations on the marks hold good for the objects. Husserl's discussion of this familiar view is worth pondering, it seems to me. Undoubtedly there is a simplification and economy of labour. The operations may be performed almost "mechanically." But is it not an exaggeration to say, or imply, that for the cognitive interest of the mathematician the signs are just meaningless marks? If so, what of the variable and of other mathematical concepts? The symbols eliminate

\* For a list of other references, see Royce, *loc. cit.*, p. 114.

† In his definition of the "sign-making function" as "The selection or construction of certain objects in order that by mentally operating with these, results may be obtained applying to other subjects," Dr. Stout seems momentarily to have forgotten all kinds of signs except the kind which he calls "symbols."



irrelevant diversity but retain a minimum of meaning, defined by the rules of operation.\* The joint article of Stout and Baldwin on *Intent* adds a phenomenological point not previously touched on. Recurring to James's phrase, "what intelligent consciousness means or intends," they contrast the "content" of consciousness with its "intent," and inserting this distinction into the context of cognitive endeavour, identify "content" with that fragment or aspect of the object which the mind actually apprehends, "intent" with the "total object, considered as goal of conscious endeavour." It follows that the "intent" is "what the mind consciously means or intends but does not yet contain." This whole doctrine seems strictly identical with Royce's distinction, in *The World and the Individual*, between the "internal" and the "external meaning" of ideas, except that Royce's turn towards the Absolute is left out.

(c) Meinong's brief, but clear statement,† has, from the point of view of phenomenology, the defect of confining itself exclusively to speech. Within these limits, however, all that Meinong says is valuable. He does, indeed, offer the general formula that we have the relation of sign to significate‡ wherever, given A, we can infer the existence or non-existence of B. In short, the sign is *causa cognoscendi* (*Erkenntnisgrund*) for the significate. To the question of the adequacy of this account, we shall return below (§ 3). In application to words, it compels Meinong at once to distinguish what words *express*, viz., the speaker's mental acts or processes, from what they *mean*, viz., the objects of his acts. It follows that

\* See Husserl, *loc. cit.*, § 20, pp. 68-70. Husserl's view supplies, too, the correct interpretation of the amusing *quids* and *quods* game in which C. I. Lewis's examination of "mathematics without meaning" ends. See his *Survey of Symbolic Logic*.

† *Über Annahmen*, 2nd edit., §§ 3, 4; to Meinong's other writings I have not had access in writing this paper.

‡ May I venture to suggest this term as the equivalent of *das Bezeichnete*? We need a simple term for the circumlocutions "thing signified" or "that which is signified."

words always mean the object of the thought which they express. It follows also that there are words which express a state of mind, but do not mean anything, *viz.*, when the state of mind is not cognitive, is not a *präsentierendes Erlebnis*. A word means an object when it expresses an act which presents that object to the mind. Artificial as this terminology is, it marks distinctions which are important. These are, however, worked out with much more detail by—

(*f*) Husserl, whose *Logische Untersuchungen* seem to me to contain the best work yet done in phenomenology. The relevant chapters,\* though difficult to read, are, in the very laboriousness of their detail, extraordinarily valuable. His treatment of *Bedeutungsintention und Bedeutungserfüllung*, leading to a *Phänomenologie der Erkenntnisstufen*, provides, it seems to me, a basis for dealing fruitfully with the tantalizing contrast between perception as presenting actual, concrete reality, but yet only a fragment or aspect of its full nature, and thought, which can present that nature more comprehensively, but yet not concretely possessed or fulfilled. From among points of detail, I may be forgiven for singling out one which is of special interest to me personally and illuminates a problem commonly ignored. Drawing attention, in my *Studies in Contemporary Metaphysics*,† to a peculiar and, as it were, essential ambiguity in the meaning of the personal pronoun “I,” I have recklessly committed myself to the statement that “I” is the only word exhibiting this ambiguity. From Husserl‡ I have since learnt that there are several classes of such words, and what is the generalized theory for them. It is the more a pleasure to acknowledge this, because my own independent discovery of part of the facts is

\* Esp. Vol. II, Part I, Section 1, *Ausdruck und Bedeutung*, chs. 1–4; and Part II (1921), Section vi, ch. 1, *Bedeutungsintention und Bedeutungserfüllung*.

† P. 256.

‡ *Loc. cit.*, Vol. II, Part I, §§ 26–28.

amply confirmed by Husserl's comprehensive treatment, which, in its turn, may perhaps gain some little support from my testimony. In general, I have only one criticism to urge against Husserl, and one misgiving. The misgiving is whether he is not beginning to over-multiply the "acts" of many diverse sorts which he needs to restore the concrete unities, after his subtle analysis has broken them up into their last, often almost vanishing constituents. The criticism which I urge with much more confidence is that Husserl, too, though perhaps excusably in the context of "logical" inquiries, limits his phenomenology to signs and meanings in the service of theory or cognition. But knowledge is only one of the autonomous ends of life, and to other autonomous ends it may stand in an instrumental relation. The use of signs or symbols is as wide as the field of mental activity, and it is to be expected that a study of signs and meanings in other forms of activity will react on, and help towards, a better understanding of them in the context of science and philosophy.

§ 3. *A Sample of Phenomenological Study.*—The title of this section is, perhaps, over-ambitious, yet having exhibited, as strikingly as I could, the inchoate state of current theory of meaning, it is "up to" me at least to make an attempt at illustrating the kind of phenomenological study for which I am pleading. For this purpose I shall single out a prominent theory and test its adequacy against as varied a range of facts as I can bring forward in the limited space at my disposal.

The theory selected is one which, in one formulation or another, is advocated by several of the best authorities. We have met with it above in Meinong's statement that one thing (A) is the sign of another thing (B) when, given A, we can infer the existence (or non-existence) of B. In vaguer terms Toennies says the same thing: "We call an object (A) the *sign* of another object (B), when the perception or recollection A has the recollection B for its regular and immediate consequence." Mr. Russell's formula, "the sensible (or imaginal) presence of

A, which is a sign of the present or future existence of B, enables us to act in a manner appropriate to B" obviously combines two things, viz., (1) what Mr. Russell also calls "the causal efficacy" of the sign, i.e., its functioning as stimulus for appropriate behaviour, and (2) its indicative (*anzeigende*) function, which latter is what Meinong and Toennies exclusively emphasize. Husserl gives the most careful statement: We have the actual functioning of a sign, "when any object or matter-of-fact of the existence or subsistence of which someone is actually aware, indicates to him the existence or subsistence of certain other objects or matters-of-fact, in the sense that his conviction of the being of the former is experienced by him as a motive (to wit, a non-intelligible motive) for the conviction or supposition of the being of the latter."\* It is important to notice that Husserl explicitly restricts this formula to one kind of sign which he calls *Anzeige* (index), whereas the other three authorities impose no restriction on the scope of their formulae. We shall find below that Husserl is right here, and the others wrong. Somewhat apart stands Peirce's formula for all signs viz., a sign is "anything which determines something else (its interpretant) to refer to an object to which itself refers (its object) in the same way."† I have never felt sure that I understand precisely what Peirce means by this formula, even when "interpretant" is further illuminated by the subsequent phrase, "an interpretant idea having been determined in an individual consciousness." I take the meaning, however, to be that something functions as sign when it makes someone think of an object, which object is then called the sign's object, i.e., the thing signified. A glance at Peirce's classification of signs suggests that his language may have been deliberately general to the point of vagueness, because neither association nor inference suffice for explaining the functioning even of those

\* *Loc. cit.*, Vol. II, Part II, § 2, p. 25. My translation.

† Baldwin's *Dictionary*, s.v. Sign.

signs which alone are taken account of in Peirce's list. This, however, is a guess, for Peirce's classification is inspired by other interests. He distinguishes *icon*, *index*, and *symbol*. An *icon* is "a sign which would possess the character which renders it significant, even though its object had no existence," *e.g.*, a pencil-streak meaning a geometrical line. An *index* is "a sign which would, at once, lose the character which makes it a sign if its object were removed, but would not lose that character if there were no interpretant," *e.g.*, a bullet-hole meaning a shot. A *symbol* is "a sign which would lose the character which renders it a sign if there were no interpretant, *e.g.*, speech means nothing if it is not understood. Judged on its merits, this classification is, surely, one of Peirce's least successful experiments. It neither covers the ground, nor touches the essence of those signs which it includes. But, at any rate, it suggests that the way in which a sign "determines" our "idea" to refer to its object is neither necessarily inference nor necessarily association. Inference is excluded in the case of icons and symbols, and association is excluded in the case of icons. It is surely not by association, in the usual sense of habitual conjunction due to experience, or "mnemic causation" (as Mr. Russell calls it), that a dot means a mathematical point. Indices, on the other hand, fit the inference formula best, though it is easy to adduce examples in which the nexus of index and indicatum is certainly, as Husserl says, and Meinong grudgingly concedes, *uneinsichtig* (non-intelligible). As a matter of fact, even where the nexus is *uneinsichtig*, it is doubtful whether "association" fits the facts. The connexion of a word with its meaning is usually called associative and ascribed to habit formed by repetition, but I venture to call attention to the evidence which I have brought forward in my article on *Image, Idea, and Meaning*\* for thinking that more than association is involved. This "more" I should now describe by saying that whilst association may

\* *Mind*, N.S., vol. xvi, No. 61, pp. 77, 78.

cover the *indicative* function of the sign it does not cover its *expressive* function.\* In any case, it seems to me Husserl is right in saying that association is not merely mechanical, but also creative; that it effects not merely conjunctions but connexions which further effort of thought may transform into intelligible or logical coherences. This view has obvious affinities with Bradley's "association marries universals."

Let us review the situation: We are confronted by a general formula for the nexus of sign and significate, which claims to be applicable to all signs, but which varies in its description of the nexus all the way from clear inference (Meinong's sign = *Erkenntnisgrund*) to habitual association (Russell's mnemonic causation). We find in Husserl explicitly and in Peirce implicitly the recognition that the formula applies, not to all signs, but only to those which Husserl and Peirce agree in calling indices (*Anzeigen*).

Can we now clear up this situation further, and develop it, by experimenting with these theoretical suggestions upon as large and varied a body of facts as possible?

The most obvious instances of things functioning as indicative signs, i.e., as grounds of inference to the existence of other things are, of course, to be found in the system of nature, more especially so far as the mutual implications of things within it have been scientifically traced out. A certain formation of clouds is a sign of approaching storm; certain anticlines are signs to the geologist of the (at least probable) presence of oil; coal and fossil bones are signs of a prehistoric flora and fauna; certain markings on Mars are signs of canals and of their makers; certain dreams are to the psychoanalyst signs of repressed complexes; diseases are recognized by their symptoms.

But now take another group of examples, in which natural objects and events once more function as signs, but not in ways

---

\* This distinction will be explained presently.

endorsed by science. A comet is a sign of impending war; entrails of animals, according to their condition, presage victory or defeat in battle; so does the flight of birds and many other kinds of omens and portents; dreams reveal the future; lines in the hand are signs of character or of coming good or ill fortune; "plant-signatures," *i.e.*, resemblances between parts of plants and parts of the human body, are signs of a divinely appointed affinity, making parts of plants effective, as medicaments or aphrodisiacs, for the healing or strengthening or stimulating of the corresponding parts of the body;\* and so on *ad infinitum*. Inference again? Yes, but resting on quite other premises than in the former group. In many, if not all, of the examples of the present group the major premise of the inference appears to be the belief in a God, or gods, or spirits, who, as it were, signal through certain events or natural arrangements, who give hints to man for his guidance, or at least reveal their mood or their attitude towards his undertakings. In short, the inference treats the signs as *indicative* of other natural events only because they are first interpreted as *expressive* of non-human or supra-human powers, the existence and purposes of which they reveal.

Let us test this distinction further.

So far we have taken our examples from signs which were in no sense man-made, man-produced—signs commonly called "natural" as distinct from "conventional" or "artificial,"† signs by which man seeks to guide himself in his adjustment to

\* The belief in plant-signatures and, similarly, in animal and mineral signatures, was once wide-spread, and elaborate treatises, setting forth the facts and recipes authoritatively, were written by reputable scientists even in post-renaissance times. Many common names of flowers, *e.g.*, lungwort, are survivals of the theory. Anyone who has hunted with a French Canadian guide can testify that French Canadians as firmly believe and as regularly act on the theory as the most up-to-date scientist believes in and acts on his theory. In China, too, I am told, the theory is widely held.

† Cf. Martinak's distinction of "real" and "final" signs, in his *Psychologische Untersuchungen zur Bedeutungslehre*.

his environment. But the clear-seeming distinction is none the less a tricky one. For, in the first place, human beings themselves may be regarded as parts of the system of nature, and all their actions—whatever they do, whatever they make, whatever they say—may be studied, like the automatic processes in their bodies, as purely indicative and not as expressive at all. Of any observable event in a human body we can, in the spirit of natural science, ask: What other observable events does it indicate (where “observable” refers not only to future events which may, or will, be observed, but also past events that have, or might have, been observed)? Husserl and Meinong, unacquainted with our ultra-behaviourists, are a little precipitate at this point. They go on at once to distinguish between what the actions indicate, *viz.*, that certain psychical processes of perceiving, thinking, willing, *etc.*, are going on in the speaker’s mind, and what the words express or mean, *viz.*, the object perceived, thought about, willed. And Husserl further analyses this expression into denotation (what is named or referred to) and connotation (the character, relation, activity, *etc.*, predicated of the object, its *Sowin*).<sup>\*</sup> A strict behaviourist, like John Watson, keeping rigidly to what is observable from a spectator-standpoint, is bound to disallow the inference to unperceivable mental processes. For him the sounds of language can be indicative only of other sounds to be heard or movements to be seen. They cannot be treated as expressive of “metaphysical” or “mystical” mental processes. The behaviourism which is ever

---

\* There are interesting minor differences here between Meinong and Husserl, which unfortunately increase the terminological chaos. When I say, *e.g.*, “That dog is angry,” they agree: (a) That a hearer can infer from my words that I am looking at and judging about the dog; (b) That the hearer, without normally attending to (a) at all, will himself be led to look at the dog and to entertain (*annehmen*), if not also to confirm, my judgment. This is for him to “understand” my words, to “know what I mean.” Husserl says that the words *indicate* (*anzeigen*), or more specifically, *communicate* (*kundgeben*), my mental processes, but that they *express* (*ausdrücken*, with synonyms *bedeuten*, *meinen*), what is the object (including Meinong’s “objective”) of my



becoming more fashionable among present-day biologists conforms, of course, strictly to this pattern. The moral, I suggest, is that we can treat human speech and behaviour (I omit the sign-making of non-human animals for simplicity's sake) as indicative of mind, and therefore as expressive, only if we have first made up our minds, in the teeth of a pronounced tendency in modern "science," to believe in the existence of minds and in their expressing themselves—*äussern*, as the Germans are able to say neatly—in visible, audible phenomena, which are for this reason expressive, interpretable signs, signs which, so to speak, make the invisible visible. For this belief we have only one ground, but that surely sufficient:—Descartes's *cogito*, or, in the common terminology, which Dr. Schiller in his Congress-paper, too, employs, and which Mr. Russell, in his reply, so strangely fails to understand, the "inner" point of view of the "agent," as distinct from the "outer" point of view of the spectator. It is because we are acquainted with what expressing is by doing it most of the time, that we are entitled to use sensibilia, not merely as indicative signs for other sensibilia, but, rising above this phenomenism, to interpret them also as expressive of other minds. Of course, each interpretation should be experimental, and subject to methodical tests. It is not to be understood off-hand as justifying those extravagances of animal psychology against which our behaviourists are in revolt. Nor is it a plea for pan-psychism, or even for Berkeley's interpretation of nature as the visual language of God. The abuse of a principle, if it has been

---

thinking. Meinong says the words *express* (*ausdrücken*) my mental processes, and *mean* (*bedeuten*) their object. It follows, as we saw above, that for him purely emotional ejaculations express but do not mean. Husserl, following a different track, denies of gestures, play of features, etc., that they "express"—in his sense of the word, on the ground that there is no intention to express or communicate or make manifest anything. Presumably, he could treat Meinong's emotional ejaculations similarly. Of course, all such utterances or actions may serve to another as indices for inference. Clearly there is room for much subtle detail-work here.

abused, is a good argument for caution in its use, but not for its abandonment.

The position tentatively reached now may be summarized as follows. With hardly an exception, everyone who has written on signs and meaning, has begun from the spectator's point of view. He has thought of himself, not in the first instance as expressing himself, or his meaning, through signs, but as confronted by signs which put to him the problem of discovering their meaning. Everyone has begun at the periphery and worked to the centre, though in expressing his findings he was at the centre all the time. If we begin from the centre, it is likely that, as Dr. Schiller says, meaning precedes expression, though "precedes" must not be taken too literally, for meaning is hampered in development where means of expression fail.\* At any rate, from the outsider's point of view, the first question is how to recognize a sign as a sign. Fortunately, this question *sollicitur ambulando*. As Toennies says, "a sign is what functions as a sign," i.e., what makes us perceive, think, feel (as the case may be) something other than itself. But this formula covers two types which few thinkers have clearly distinguished. The question, what does this sign mean? covers the two questions: (a) what does this imply, or what can be inferred from this? (b) what does this express? This gives us the distinction between the *indicative* and the *expressive* function of signs. It is the expressive function which gives rise to the most interesting and subtle phenomenological problems, which I can here only indicate. Thus, e.g., when we analyse what is expressed, we are led to distinguish between mental acts which have, or present, objects and mental acts which are non-presentative. Any other person to whom, intentionally or not, we communicate ourselves through our expressions, may, if he pleases, so interpret them as to learn of our mental acts, but as a rule he will be so

\* I regret that I am not well enough acquainted with Croce's work to say how far his theory of expression would fit in with these suggestions.

wholly interested and absorbed in their objects, that he attends neither to his own thinking (which is yet involved in his understanding us) nor to ours—only to *what* we think in expressing ourselves and what he, too, thinks in understanding us. So it is, too, with the solitary thinker. He expresses himself, he uses signs (whatever their nature in detail may be); we may even say that he is communicating with himself. Yet he attends to his own signs and his own processes of thinking as little as he does to another's in reading or listening. He, too, is as a rule wholly absorbed in *what* he is experiencing in thinking: he "lives in" his objects, as almost every writer on meaning justly reiterates.

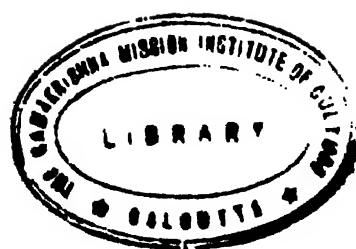
All this touches but a small corner of the subject, though it is the corner which, as nearest to their own work, philosophers have most often sought to explore. But beyond it lies a large field which is almost virgin soil. Let me, in conclusion, only indicate, at random, groups of facts by which our initial theory must be further tested and perhaps transformed.

(i) The combination of indicative and expressive functions in the same sign offers many problems. Husserl and others treat mnemonic signs (*e.g.*, knot in handkerchief), discriminative signs (*e.g.*, a brand on cattle), and such signs as national flags or monuments as purely indicative. But it might well be argued that any arrangement purposely made to serve as a sign has an expressive function, too; especially when, like a flag, it may be an excitant of intense emotions and actions. To restrict these signs to the indicative function is to keep too closely to the outsider's standpoint. Should we not ask also how much of ourselves we can express through such signs as these? Take, *e.g.*, badges of rank, signs of office, professional garb, like a military uniform, a cleric's cassock, a scholar's gown. They obviously serve as indices to others, but may they not help the wearer to be more effectively what they declare him to be, to play more fully the part among men for which he is dressed?

(ii) The problem of the proverbial "thoughts too deep for words" has all too rarely led philosophers and psychologists to explore the expressive value of non-verbal symbolic actions, indeed, the need of expressing in action what cannot be said in words. Human life is full of such actions, especially where deep affection is involved. And thence open vistas upon ritual in religion (and elsewhere), for which I must be content to refer, as an illustration, to Miss Dougill's essay on *The Language of the Soul* in Canon Streeter's book on *The Spirit*.

(iii) Lastly, there is the symbolism of art—a field of meaning and expression of meaning almost unexplored from the side of phenomenology. No one will say that the sounds of music are "mere" sounds: no, they are expressive, they are charged with meaning, though what they mean can hardly be translated into, or expressed in terms of, any other language, unless it be dancing. Inference and association here leave us in the lurch as explanatory principles. Even the distinction of the indicative and expressive functions of signs becomes almost an irrelevant artificiality when applied to music—a reminder of the wholly tentative character of the results we have so far reached. But this itself is but another argument for the plea: More phenomenology!

---



*Meeting of the Aristotelian Society, at 21, Gower Street,  
London, W.C. 1, on March 7th, 1921, at 8 p.m.*

## V.—COSMIC EVOLUTION.

*By J. E. BOODIN.*

THERE is a fascination about creating a world from the beginning. So we shall always have our cosmogonies. But the temptation is, not only in philosophy and religion but also in science, to adopt the geocentric point of view. We are prone to treat the evolution of our earth as an independent drama. Science finds it convenient to proceed from the simple to the more complex. This, no doubt, has its justification as a device of method. Science deals with sequences and the predictions based on their recurrence. It cannot explain why one event follows another. This is the province of philosophy or religion, not of science. Science ascertains that life appears on the earth under certain conditions. It should not say, though it is prone to say, that the previous events or conditions gave rise to life or created life. It should, however, aim at a complete inventory of the conditions.

It was observed long ago, by Heraclitus that there must be an upward and a downward path in the movement of reality. Science sees only the downward path. It starts with the unequal distribution of energy, and observes that motion is produced by energy flowing from a higher level to a lower level. Its characteristic law is the law of degradation of energy. Everything tends towards the level of unavailable intra-molecular vibration or dispersed heat. The universe of science is on the road to bankruptcy. What is more, if the universe is thus a running-down concern, be the loss of energy ever so small in each transaction, so long as it is a finite quantity, the universe must have gone dead ages ago. But somehow the universe seems to be a going concern, and

this should give us pause. It would seem, at any rate, that in the cosmos as a whole there is perpetual motion.

Science misses the significance of this fact because of its bias. It selects certain aspects that suit its convenience. It is interested in description and prediction, and therefore emphasizes the quantitative and measurable aspects. Hence its partiality for the lower grades of existence, in short, for the inorganic, and its attempt to reduce everything else into terms of the physico-chemical. It fails to see the significance of the aspects it selects within the life of the whole, and therefore lands in absurdity. It deals with the past, with the stream of reality as it congeals into habits and structures and their uniformities. The onward sweep, the creative passing of nature, escapes it or at most receives consideration only so far as it can be stated in quantitative symbols. It is absorbed in particulars and so misses the concrete flow of the real world. Yet to understand the downward path we must understand the upward path, to understand the part we must understand its interactions within the whole.

Because of the bias of science and of its geocentric point of view, it is under the necessity of accounting for the higher levels, such as life and intelligence, as having been produced by the preceding stages. Thus we have to account for life in terms of the lifeless and intelligence in terms of the unintelligent. Chance becomes the absolute arbiter of evolution. But this makes it impossible to account for order and meaning in the world.

In order that we may discover system in the facts of perception, there must be the basis of system in the facts themselves, as well as in the mind which selects and constructs. The mind itself, moreover, is not a thing apart in the cosmos, but is itself the product of cosmic evolution. The demand for system in it cannot be alien to the cosmos. Now the characteristics which are necessary for any system whatsoever are diversity, recurrence, and order. Unless there is diversity

in our material we shall have no basis for constructing systems, for there will be nothing to systematize. Again, unless our diverse facts or variables recur, *i.e.*, unless they have such a constancy or generality as enables us to identify them again and deal with them as the same for the purpose in question, whether it be a mathematical problem or a chemical analysis, we obviously cannot have system. In a world where nothing recurs, we can say nothing about it, for there remains neither any mind to say anything nor any object to say anything about. Finally, there must be an implied order in the facts with which we deal. Else we shall never discover order. And it is the business of science to discover order, not to impose an arbitrary order. If you reply that order for science is merely a matter of convenience, then we should reply that, in a world without order, one way of reading the facts could be no more convenient than another, for in such a world there could be no basis for the prediction of events. The events of the scientist's mind would be equally crazy with the outer events and no agreement would be possible. We must, then, presuppose order in the cosmos, if we are going to have science. Is it possible that this order itself is the product of chance?

Science is becoming gradually aware that we cannot account for the order even in physical nature on the basis of mere chance. The investigations of Professor Henderson lead him to the conclusion that there is "revealed an order or pattern in the properties of the elements."\* This order, to be sure, is "hidden, when one considers the properties of matter abstractly and statically, for it is recognizable and intelligible *only* through its effects. It becomes evident only when time is taken into consideration. It has a dynamical significance and relates to evolution."† It is an order, moreover, that we discover in nature. It is no more subjective than the periodic

\* *The Order of Nature*, Lawrence J. Henderson, p. 184.

† *Ibid.*, pp. 184, 185.



law of elements. But it is a dynamic order, and has significance only in a moving equilibrium such as nature is. It is in the relation of inorganic evolution to organic evolution that this significance becomes especially clear. Henderson comes to the conclusion that the complicated set of conditions necessary for the existence of life imply such an orderly selection: "There is, in truth, not one chance in countless millions that the many unique properties of carbon, hydrogen, and oxygen, and especially of their stable compounds, water and carbonic acid, which chiefly make up the atmosphere of a new planet, should simultaneously occur in the three elements otherwise than through the operation of a natural law which somehow connects them together. There is no greater probability that these unique properties should be without due (*i.e.*, relevant) cause uniquely favourable to the organic mechanism. These are no mere accidents; an explanation is to seek. It must be admitted, however, that no explanation is at hand."\* And no explanation is possible so long as we look upon geological evolution as an isolated affair. But more of this later. The probability of order can at any rate be statistically established. "We can, on no account, unless we are to abandon the principle of probability which is the basis of every scientific induction, deny this connexion, in character an adaptation, between the diversities of matter and the diversity of evolution. . . . Other things being equal, there is a maximum 'freedom' for such evolution on account of a certain unique arrangement of unique properties of matter. The chance that this unique ensemble of properties should occur by 'accident' is almost infinitely small (*i.e.*, less than any probability which can be practically considered). The chance that each of the unit properties of the ensemble by itself and in co-operation with the others, should accidentally contribute to this 'freedom' a maximum increment is also

infinitely small. Therefore there is a relevant causal connexion between the properties of the elements and the 'freedom' of evolution."\* By "freedom" is meant freedom of trial and error experimentation with a chance of "considerable success."

Following the lead of Willard Gibbs, Henderson endeavours to bring his argument to a focus by laying down certain postulates. One has to do with the conservation of properties. "The properties of elements are to be regarded as fully determined from the earliest conceivable epoch and perfectly changeless in time."† This postulate does not rest merely on *a priori* reasoning, but on experimental evidence. Spectral analysis identifies the presence of the same elements with the same properties in other parts of the cosmos, and that seems to hold irrespective of the age and temperature of the celestial bodies. We know also that meteoric iron has the same specific gravity and properties as terrestrial.‡ In the absence of evidence to the contrary, we may then regard the properties of elements as constant. Again, the characteristics of systems may be treated as independent of the properties of any particular energy complex. We may then lay it down as a postulate that "the abstract characteristics of systems must also be fully determined and absolutely changeless in time."§ The separation of the characteristics of systems from the matrix of properties and conditions has, of course, its statistical convenience. But we must not forget that we are dealing here with a logical abstraction. The human mind is itself an energy system among energy systems. It is part of the cosmos. Because it possesses the characteristics of system, it can discover system in the objective world. But it can do so only because the objective world itself possesses the characteristics

---

\* *The Order of Nature*, pp. 190, 191.

† *Ibid.*, p. 201.

‡ Faraday Lecture by Professor Richards, 1911.

§ *The Order of Nature*, p. 202.

of system, *i.e.*, because there is the necessary diversity, recurrence and order in its events. The fitness of the properties and elements for system can, therefore, not be an accident as it is in the Kantian philosophy where the mind is treated as a thing apart. Henderson states the fitness of the facts for system in the following proposition: "The relation between the numerous properties of hydrogen, carbon, and oxygen severally and in co-operation (relatively to the same relation between the properties of all the other elements), and the necessary conditions of existence in respect of number, diversity, and durability, as these conditions are defined by Willard Gibbs is not merely contingent."\*

What is of interest to us is that inorganic nature is such that it makes possible the discovery of systems in its behaviour; that, moreover, this order is forwardlooking or an adaptation to the appearance and development of life. Henderson's statistical evidence points to the conclusion that the fulfilment of the conditions for life involving, as they do, the establishing of the proper quantitative proportions, the concentration and availability of certain necessary elements such as carbon, hydrogen, and oxygen, and their compounds water and carbonic acid, with the ensemble of characteristics and conditions necessary for the existence and development of life, is so complicated that it is infinitely improbable that it should have happened by chance. "Hence we are obliged to regard this collocation of properties as in some intelligible sense a preparation for the processes of planetary evolution,"† and "as possessing a teleological character." Further than this Henderson does not go. He does not show why the processes on our earth should have a teleological character, and no such explanation is possible so long as we limit our attention to our earth and its conditions.

\* *Ibid.*, p. 202.

† *Ibid.*, pp. 191, 192.

If we now pass from the inorganic to the organic level of existence we find the same problem, only more complicated. No one has faced the problem with greater candour than Professor Osborn. While Osborn adopts the physico-chemical theory of life, he does so without committing himself to materialism. "Without being either a *mechanist* or *materialist*, one may hold the opinion that life is a continuation of the evolutionary process rather than an exception to the rest of the cosmos, because both mechanism and materialism are words borrowed from other sources which do not in the least convey the impression which the activities of the cosmos make upon us. This impression is that of limitless and ordered energy."\* He makes it clear that the evolution of life upon our planet must be regarded as a distinctly new step in the process of development. "As compared with stellar evolution, *living matter does not follow the old evolutionary order*, but represents a new assemblage of energies and new types of action, reaction, and interaction—to use the terms of thermodynamics—between the chemical elements which may be as old as the cosmos itself, unless they prove to represent an evolution from still simpler elements. The evolutionary process now takes an entirely new and different direction . . . essentially constructive. . . . It is a continuous creation or creative evolution." But how is such a creative step, with the series of creative steps to follow, possible? He does not regard it impossible that some new element may be discovered in life compounds. But he thinks it more probable "that unknown principles of action, reaction, and interaction between living forms await such discovery. The difference between the lowliest organisms and inorganic compounds does not seem to him so vast but what we may discover the bridge—"namely, whether it is solely physico-chemical in its energies, or whether it includes a *plus* energy or

\* *The Origin and Evolution of Life*, Henry Fairfield Osborn, p. 3.

† *Ibid.*, pp. 4, 5.

element which may have distinguished life from the beginning.”\* But in any case he is convinced that “there is positive disproof of an internal perfecting principle or entelechy which would impel animals to evolve in a given direction, regardless of the direct, reversed, or alternating directions taken by the organism in seeking its life environment or physical environment. . . . The conclusive evidence against an *élan vital* or internal perfecting tendency, however, is that these characters do not spring autonomously at any one time ; they may be dormant or rudimentary for great periods of time. . . . They require something to call them forth, to make them *active* so to speak.”† This arousing of a latent new character may be effected through chemical messengers “by stimulating the transformation of energy at a specific point.”

As regards the arising of new forms, Osborn rejects emphatically the doctrine of chance which, since Darwin, has been fashionable with writers on evolution. “I have long maintained that this opinion is a biological dogma . . . which has gained credence through constant reiteration, for I do not think that it has ever been demonstrated through the actual observation of any evolutionary series.”‡ As a matter of fact, the series of lifeforms on the earth has not been such as we should expect on the basis of chance. The existence of law in the evolution of life is no longer a matter of opinion but of direct observation. So far as law is concerned, we observe that the evolution of lifeforms is like that of the stars ; their origin and evolution as revealed through paleontology go to prove that Aristotle was essentially right when he said that “‘nature produces those things which, being continuously moved by a certain principle contained in themselves, arrive at a certain end.’” But this end is no “supernatural or teleological inter-

---

\* *Ibid.*, p. 281.

† *Ibid.*, p. 279.

‡ *Ibid.*, p. 8.

position through an externally creative power," but is a law immanent in the process itself.

Before committing ourselves to Aristotle's concept of law in nature, it would be well to try to understand what Aristotle means. And this is fraught with great difficulty, for Aristotle himself is far from being clear. There is in Aristotle's theory the formal cause,—what the thing is to be. When he deals with organic processes, this may be said to be present in the process as its essence. This is hardly the case when he deals with æsthetic processes, such as the making of a statute, and still less when he deals with the order of an army. In any case it is not statable in physico-chemical terms. But we must also take account of the final cause, the Platonic *Idea* realized. This is supposed to exercise an attraction by its mere presence, not by any action of its own on the process in question. Each process has its final cause as well as formal cause, but God is the final cause of the entire evolutionary process. It is not clear, however, how the pure, self-contained activity of God can make any difference to the process of evolution. If it is the desire in the process for the final cause which accounts for the process, then it is not obvious why the final cause need exist, and we are still under the necessity of accounting for the existence of this desire. We still have the anomaly of evolution lifting itself by its boot-straps, unless we admit with Aristotle that God gives the universe its initial push from without. This, however, is hardly an intelligible or workable idea. Nor does it seem as though a law immanent in the process, such as Osborn seems to postulate, could account for the process taking on new form and character. On the basis of an eternal law it would seem rather that the process should remain eternally what it is. But this is just what it does not seem to do if we take account of geological evolution alone. Only the whole is self-sustaining, self-contriving, and moves by its own law. Each part moves as it does by virtue of the actions, reactions, and interactions of the part within the whole.

The philosophy of Osborn is vague, but his empirical formula is better than his philosophy. He proposes as the fundamental law of life its determination through four energy complexes: "In each organism the phenomena of life represent the action, reaction, and interaction of four complexes of physico-chemical energy, namely, those of (1) the inorganic environment, (2) the developing organism (protoplasm and body-chromatin), (3) the germ or heredity chromatin, (4) the life environment. Upon the resultant actions, reactions, and interactions of potential and kinetic energy in each organism, selection is constantly operating wherever there is competition with the corresponding actions, reactions, and interactions of other organisms."\* The Darwinian principle of natural selection is thus given a subordinate, though a real, place. Since the beginning of life there has been competition of organisms with other organisms as well as the survival selection of the inorganic environment. But "Selection is not a form of energy nor a part of the energy complex; it is an arbiter between different complexes and forms of energy; it antedates the origin of life as remarked by Henderson."† To quote but one illustration of the inadequacy of Natural Selection as an explanatory principle "The general fact that the slow-breeding elephants evolved very much more rapidly than the frequently breeding rodents, such as the mice and rats (*Muridæ*) is one of the many evidences that the rate of evolution may not be governed by the frequency of natural selection and elimination."‡ Neither the origin nor the development of life can be accounted for by this principle. Moreover, many species have disappeared without, so far as we can see, the interference of natural selection—by some internal rhythm which we do not understand. Special emphasis is laid on the continuity and guiding

---

\* *Ibid.*, p. 21.

† *Ibid.*, p. 20.

‡ *Ibid.*, p. 271.

influence of the heredity chromatin. But while it is supposed to be the presiding genius of all phases of development, we are ignorant as to how it accomplishes this. "We are equally ignorant as to how the chromatin responds to the actions, reactions, and interactions of the body cells, of the life environment, and of the physical environment, so as to call forth a new and adaptive character, unless it be through some infinitely complex system of chemical messengers and other catalytic agencies."\* We do not even know that it is an energy complex. Surely a large bill of ignorance, and hardly justifies all the superlatives with which biologists invest it. In some way it is evidently subject to modification. Osborn suggests that as there is a centrifugal action whereby certain cells of the reproductive glands affect, in an important way, all the body cells, including the brain centre of intelligence, so it is likely that there is a "centripetal action whereby chemical messengers from any part of the body specifically affect the heredity germ and thus the new generation to which it will give rise." The heredity germ is not entirely indifferent to the external environment. "Taking the whole history of vertebrate life from the beginning, we observe that every prolonged old adaptive phase in a similar habitat becomes impressed in the heredity characters of the chromatin. Throughout the development the chromatin always retains, more or less, potentiality of repeating the embryonic, immature and more rarely some of the mature structures of older adaptive phases in the older environments. This is the law of ancestral repetition."†

If the causes of evolution are obscure, the sequences are becoming increasingly clear. "What we have gained during the past century is positive knowledge of the chief modes of evolution; we know almost the entire history of the transformation of many different kinds of mammals. These modes,

\* *Ibid.*, p. 98.

† *Ibid.*, p. 152.



as distinguished from unknown *causes* are expressed in the following laws: first, the *law of continuity*; *natura non fecit saltum*, there is prevailing continuity in the change of form and proportion in evolution as in growth."\* Perrin Smith, in the case of the cephalopod molluscs and the Triassic ammonites, "observes that the evolution of form continues uninterruptedly, even when there is no evidence whatever of environmental change. Conversely environmental change does not necessarily induce evolution—for example, during the Age of Mammals, although the mammals developed an infinite variety of widely different forms, the reptiles show very little change."† This graduated character of change in the evolution of life was clearly expressed in the mutations of Waagen, who discovered a complete fossil series of Ammonites in 1869, and formulated Waagen's law. "It is that certain new characters arise definitely and continuously and, as Osborn has shown, adaptively."‡ Osborn does not forget the fact of mutations in the more recent sense, but he feels that they play a minor role, accounting for no more than one-fifth of the variations in mammal evolution. Biologists may object to such a stepmotherly treatment of a current hypothesis. Perhaps it cannot be brushed aside so lightly. But the difference may not be so great as appears. The concept of mutations is not without its ambiguity, since any variation which persists in heredity is called a mutation. It becomes, therefore, to a considerable extent a matter of definition. This we must leave to those concerned. One thing is certain, viz., that in many processes we observe a graded and orderly sequence leading towards a specific end. As Bergson has so well pointed out, the mere fact that variations come in sudden leaps would, no more than small variations, account for the adaptation of such a complicated organ as the eye for seeing.

---

\* *Ibid.*, p. 251.

† *Ibid.*, p. 251.

‡ *Ibid.*, p. 139.

It would rather increase than lessen the difficulty. If we must reject an innate *elan vital*, we must seek the clue for such adaptation in cosmic interaction. We can agree at least that if there had been no light there would have been no eyes. This is no accidental correspondence. We must rather suppose that it is due to the organizing presence of light patterns that the organism was led to contrive eyes. This has been, moreover, a trial and error process, upon the successes and failures of which natural selection has acted.

This leads us to the second law, "the *law of rectigradation*, under which many important new characters appear definitely, and take an adaptive direction from the start."\* Thus we "observe in the characters springing from the heredity chromatin a *predetermination* of another kind, namely, the origin through causes we do not understand of a tendency toward an independent appearance or birth at different periods of geologic time of similar new and useful characters," not in the ancestral body forms.† The discovery of this law, with which Osborn's name is especially associated, is the strongest argument for order in evolution as opposed to blind chance. "The third law is the *law of acceleration and retardation*, witnessed both in racial and individual development, whereby each character has its own velocity, or rate of development, which displays itself both in the time of its origin, in its rate of evolution, and its rate of individual development."‡ The last law underlies the profound changes of proportion as illustrated in mammals, for example the long neck of the giraffe and the short neck of the elephant. Few new characters are observed to originate in mammals. The changes are due for the most part to loss of characters and changes in proportion. This individuality of characters, their separate rate of movement.

\* *Ibid.*, pp. 251, 252.

† *Ibid.*, pp. 251, 252.

‡ *Ibid.*, p. 252.

and their co-ordination, furnish to-day the bulk of descriptive explanation of life forms and functions. Their evolution exemplifies the law of compensation. The special development of one character means the sacrifice of others, as in the case of the extra toes of the horse. The sacrificed parts are never regained, and in this sense chromatin evolution is irreversible. Reversal of adaptation must be regarded as "the reversal of function rather than of structure."\*

Such are some of the problems of evolution, frankly stated by Osborn. But *how* shall we account for the appearance of life as a new synthesis of energies, for the appearance of new characters, new species and individuals in the life process, and for the order and adaptiveness of the evolutionary series? No doubt the biologist must fix his mind on Osborn's four causes, viz., the inorganic environment, the developing organism (protoplasm and body chromatin), the germ or heredity chromatin and the life environment, with their action, reaction, and interaction. But these obviously do not account for the adaptiveness of the physical level for the emergence of life, nor for the origin of the organic level of energy with its new and unique ensemble of properties, nor for the emergence of new properties and their adaptive order and organization in the evolutionary series. If you assume that these characters are stimulated by chemical messengers, you must still account for the origin and order of properties and show how chemical messengers are stimulated and controlled. The scientist may be satisfied to trace the sequences and their apparent conditions; but the philosopher cannot stop here. He must furnish a *rationale* of the process as a whole; and this the one-way series of the earth's evolution cannot furnish by itself. I do not see any reason for assuming that the inorganic environment has any special wisdom for guiding and controlling the evolutionary process. We must take account also of cosmic inter-

\* *Ibid.*, p. 198.

action and control. The interaction with the sun is important, but it is not sufficient. I would rather be a sun-worshipper than a materialist. But solar energy cannot communicate what the sun does not possess.

It is evident, at any rate, that the evolutionary process implies factors which are not indigenous to our earth taken in isolation, or even as a storehouse of solar energy. To say that the new factors are due to creative evolution is merely another way of stating that they appear in a certain sequence on our earth. It does not explain why they appear. Nor are we greatly aided by the suggestion of Arrhenius that the simplest forms of life are carried by dust particles and sown into interstellar space, to be picked up somehow by moving masses. Apart from the difficulties involved in such an hypothesis, it could not explain why a planet should evolve so as to be prepared for life; nor could it explain the evolution of new characters and forms. The step from the spores to the cell seems as insurmountable as the step from the inorganic to the spore. And how should we account for the appearance of new characters and their adaptive order? They must be wise spores to account for all this. Is it not more reasonable to assume that life-giving patterns from the cosmic continuum shape themselves a body even as light patterns shape themselves an eye?

If the gulf from the inorganic to the organic is insuperable on the basis of mechanism and chance, so is the gulf from the organic to the mental. "There is no alchemy by which we may get golden conduct out of leaden instincts (so Herbert Spencer told us very truly)."\* So there is no alchemy by means of which we can compound automatic reflexes into selective thought. It is false to oppose thought to conation. Thought is but the will-to-know. And thought can know the order implied in itself and the universe only by a trial and error process until

\* *The Idea of Progress*, W. R. Inge, p. 33.

it gradually finds the successful method. This is as true in the realms of the good and the beautiful as in the realm of the true. For true means true for an interest which seeks fulfilment, and the final interest is to live and to live more abundantly.

Thought must thus be understood as an energy system, selecting, rejecting, coordinating and integrating the energy characters communicated to it. Its function is a double one—that of discovering the order of the energy patterns with which it deals, and that of communicating its energy pattern to a special part of the matter of its environment. It thus recreates or reconstructs its world and gives rise to science, morality, art and religion, according to the aspect emphasized: science as the product of the will to know, morality as the objectification of the desire to live harmoniously in social relations, beauty as the desire for disinterested enjoyment, and religion as the desire for personal communion with the universe. But thought cannot be understood as isolated and cut off from the rest of the universe. It can arise only in the interactions of social relations. It presupposes an intersubjective continuum. Just as the organism has been evolved so as to respond to the physical continua of light, heat, chemical change and material impact, so it has been differentiated for the purpose of mental interaction—the response to other subjects or personalities. Only so could we become aware of other minds. If we say that we respond sympathetically because of various modifications or inlets of our instincts (McDougall), this only pushes the problem further back into the history of the race. Just as the eye has been created in response to light, so these inlets have been created in response to the mental continuum. Neither has happened by a series of accidents, but as a result of an adaptive growth in response to the requirements of the universe. In this social interaction we find that fruitful contacts are established when a higher level of culture comes into touch with a lower level of culture, given, of course, the creative response of mind. So the

possibility of thought at all and the progress of thought are possible because of the flow from a higher level of organization in the cosmos to a lower level. For in the last analysis thought is part of the cosmic order communicated to our organism when it is prepared, and increasingly as it becomes further prepared. The limit for us of perfect order, perfect system, is the dawning consciousness of the order and system which prevail in the universe and strive for *rapport* with us.

Modern philosophy has been inclined to follow the lead of science and to regard the universe as a one-way series proceeding from the simple to the more complex. The aspect which philosophers have selected as the ultimate stuff of things varies, but the difficulty is fundamentally the same. They may start with material atoms or electrons and their chance combinations. They may go further back and start with a homogeneous fluid stiffened into vortex rings by introducing motion. They may even try to compound the world out of neutral stuff by means of velocity. They may presuppose nothing but the geometrical concept of space-time and its growing complexities of transformation. We have here no interest in the details of such attempts nor in their logical consistency. In every case we have the same difficulty, namely, that of showing why such combinations should yield anything but the facts with which we started; why matter should yield anything but matter, space-time anything but space-time. To say that the higher levels of existence emerge from the simpler levels is to beg the question. How could they emerge from them? How can any process lift itself by its boot-straps? We are really asked to believe in a series of miracles which have no intelligible basis in what is supposed to precede.

It is probable, however, that the constitution of the universe may be pluralistic, that our cosmic continuum may be a complex of many levels, that the higher stages or levels with their characteristics and order, are not created by the earlier ones, even though they may succeed them in our geological

series, but are due to a give and take process in the universe, higher levels being due to higher levels elsewhere. Thus life may not emerge merely from inorganic elements and their ensemble of conditions, but may imply, besides, the communication of unique energy patterns which furnish the unique synthesis of the specific ensemble. We know that our earth cannot be regarded as an independent entity in the universe. It floats in a continuum of energies of vast complexity. It is a torpedo driven and directed by electro-magnetic waves through infinite space. And as the earth's physical motion and direction is thus furnished by the continuum of which it is a part, may not its order of development be thus dictated in interaction with its unique constitution and its cumulative character of development. We have here the *plus* energy which makes upward evolution possible, which winds the cosmic clock. We know that the development of life would not be possible on the earth except for the action and storing of solar energy. We know that plants owe their symmetry of development to the action of solar rays. May it not be that the process as a whole imitates the order of the larger cosmos as the flatfish through its eyes imitates the pattern upon which it lies, not knowing what it is doing? The universe as a whole may be a system of compensating rhythms where worlds grow up and die as parts of a self-sustaining whole. The life cycles of the earth no more happen by chance than those of the individual organism which is a part of its history. It is absurd to suppose that the cosmic system as a whole emerges from chaos. In the rhythmic whole the higher levels may always be compresent with and interpenetrate the simpler levels of existence and the whole may be dominated by creative genius. Law and order on the simpler levels may be due to the directing by such universal genius communicated from part to part, ever present to create according to the unique conditions. The role of matter may be to furnish the storage of energy and the complexity of conditions required for such creativeness.

It is absurd to deny this because of the limitation of our instruments if the facts point that way. Our instruments—our seismographs, our telephones, our Crookes' tubes, our sense-organs—are necessarily attuned to special types of impulse. Now the only instruments that could respond to life patterns are certain complexities and conditions of matter that nature furnishes, and that we have tried in vain to imitate. The only instruments that can respond to thought patterns of energy are neural systems of a certain complexity and intensity. The only instrument that can respond in the way of spiritual communion is a devout heart. In each case the impulse which makes possible a new synthesis comes from without—from the larger order of the universe. This is the element of grace, the divine gift which makes us, finites, more than we are and wiser than we know. It is this which impregnates the existing order and endows it with the hidden potentiality by means of which it can create new steps, be it the new syntheses in inorganic nature and their ordered procession to life, the adaptative series of life forms, or the new inventions in art, science, and morality. It is true that every noble thought and every holy desire comes from above. It is a cosmic inspiration for which we, through a process of infinite and painful trial and error experimentation—for cosmic ages unconscious and now partly conscious—furnish the body, the vehicle, the conditions, and at length the responsive soul. In every case the genius in nature is wiser than we with our artificial manipulations and our attempts to imitate nature, for nature has devised instruments for the selective response to light waves with their complexity; it has originated life compounds with their unique capacity for response to the universe; it has devised a complicated nervous system for the reaction to thought patterns, long before we have become conscious of the existence of such instruments. We are like ants moving on an immense sphere who, because of the limitation of their senses, might imagine that they live in flat land and construct a geometry of two dimensions. But just as



an unusually wise ant might discover the discrepancy of its theory with the behaviour of the universe and infer another dimension, so we through our failure to give a reasonable account of our world must learn to discover other dimensions of the reality that lies about us, and in which we live and move and have our being. While, moreover, we are apt to notice the creative discontinuities in nature only when they become striking and wrench our habits of thought, such as the passing from one level of reality to another—from the inorganic to the organic, from habit to thought—we must remember that the creative passing of nature within each level no less requires explanation. It is just as difficult to explain how the combination of hydrogen and oxygen in the proportion  $H_2O$  can, under certain conditions, produce the unique ensemble of properties that we call water as how certain chemical elements in a certain proportion and under certain unknown conditions can produce life. In each case we must add the genius of nature. We may be confident that the creative order which has brought us hither and which evokes our admiration and awe has its sufficient reason. If Aphrodite did rise in her full-formed beauty from the briny deep, it was not altogether owing to the potencies of salt water. There was also the cosmic genius of Zeus.

We may think of the universe as a sort of organism or superorganism. Now we know that the organism develops as it does, not merely through the action and reaction of its parts, but by virtue of the interaction of its parts. And by interaction we mean "what is going on between material parts which are connected with each other by other parts and cannot be analysed at all by the two great dynamic principles alone without a knowledge of the structure which connects the interacting parts."\* We have been concerned in the past mainly with the interacting function of nerve impulses. But latterly we are learning that "an interacting enzyme, hormone,

\* *The Origin and Evolution of Life*, by H. F. Osborn, p. 15.

or other chemical messenger circulating in the blood may profoundly modify the growth of a great organism."\* Thus Osborn holds "that every physico-chemical action and reaction concerned in the transformation, conservation and dissipation of energy produces also, either as a direct result or as a by-product, a physico-chemical agent of interaction which permeates and affects the organism as a whole or affects only some special part."† In the complex economy of plants, chemical messengers, in the absence of a nervous system, furnish the sole means of interaction. But they are no less important in the animal economy as is adumbrated in the effects on growth and proportion of such ductless glands as the pituitary body and the thyroid and parathyroid glands. It is by means of these messengers that the body acts as an organic whole. What is more: "The so-called organs of internal secretion are not unique, but the bones, muscles, skin, brain, and every part of the body are furnishing internal secretions necessary to the development and proper functioning of all the other organs of the body."‡

If we look upon the universe as an organic whole, then we must suppose that the parts not only act and react, but that they also interact. Through such interaction every part of the universe comes to participate, in so far as it is prepared to participate, in the energy patterns—the complexity, order and development—of other parts, and is thus stimulated and controlled, *i.e.*, subject to its own reaction as determined by its process of development. Since in the universe as a whole all the levels of reality may be supposed eternally to co-exist, there would thus be provided the *rationale* for the evolution in any one part of the cosmos from a lower to a higher level of existence without introducing magic. How energy patterns are emitted and transmitted

\* *Ibid.*, p. 15.

† *Ibid.*, p. 16.

‡ *Ibid.*, pp. 289, 290.

from part to part of the cosmos is a problem which must wait for further investigation. We are familiar with some energy patterns which are thus transmitted, such as light and radiant heat. Lately we have become acquainted with a variety of energy rays, the existence of which we had not suspected. I have maintained elsewhere that in social interaction we must assume an intermental continuum of energy, or rather that our minds are differentiations and concentrations within such a continuum. This seems the only alternative to solipsism. What, except prejudice, can there be in the way of our supposing that our earth in its actions and reactions transmits through the common continuum energy waves which correspond to its characteristic complexity of composition, form and development, such impulses finding their way to other parts of the universe, there to undergo selection and response in so far as conditions are prepared. For we must remember that not only physico-chemical, radioactive and other inorganic energies are part of the earth's life and control; but organic, mental and even the most spiritual energies are part of its unity and life. And we have reason to believe that in its interactions with other parts of the cosmos the earth acts not only through differential impulses but as a unique whole, under one control.

I do not say that the body of matter is communicated in the form that our senses reveal. But neither is the parathyroid gland transmitted to our toes. What it does transmit is its characteristic action in the form of a secretion. We know that the violin in the hands of the skillful player transmits in its tone-quality all the qualities of the complex structure and its manipulation, the qualities of its strings, its bridge, its body (the nature of the wood and its age as well as its form), the bow, the atmospheric effects, the peculiar touch of the player, the personality of the player, the harmonies of the musical composition. All these qualities and impulses are transmitted by means of the air to the complex reagent, the expert listener, who selects and identifies the various elements

—the make of the violin, the composition, the player, etc. And the expert listener can identify the various instruments and their unique contribution in symphonical orchestration. So the spectrum reveals the chemical elements with their properties and periodicity in distant stars. The electric current carries the living voice and will of the speaker over distances of hundreds of miles and communicates them in kind to the human instrument at the other end; and this instrument is stimulated to a special type of action or inhibited in a special way. It responds to the logic as well as to the energy of the personality at the other end of the telephone, where physical, chemical, neural and mental forms of energy with all their complexities contribute to the production of the impulse sent. If we substitute our earth for the human individual, we must suppose that it communicates, whatever be the medium (perhaps radioactive secretions), in the impulses it sends out, the whole complexity of the energies of its constitution, with its order and movement, to be received selectively and in kind by such cosmic instruments as are prepared to receive them. And so reciprocally; does the earth receive the complex impulses which constitute the entire life in epitome of the vast array of celestial worlds which with our humble earth go to constitute the whole. Receives, but responds only to those energy forms for which its organization is prepared. There may be an indefinite number of higher levels to which we fail to respond for lack of proper organization—waiting for the appropriate conditions, as life and mind waited for such conditions. As mind or intelligence with us is fundamentally social, a focus of mental interactions, so there may be in the cosmos a continuum of spiritual interactions of various levels of which we are ignorant or at best catch a glimpse in the intuitions of genius, in mystical communion, in the intimations of beauty and immortality. Thus the law of mutual aid holds in the cosmic economy. Cosmic genius points the way, sets the ideal for us, pitiable creatures of a day.

There is no reason to suppose, however, that, in the universe as a whole, all possible levels do not coexist. If our universe is a rhythmic whole, then it must exist at the top as well as at the bottom. In the system as a whole, each level is instrumental to the next level—the inorganic level to the organic, the organic to the mental, the mental to spiritual appreciation and communion. At the same time it is the higher level which communicates its order to the lower—the lower, like a cosmic virgin being prepared through processes of growth which it cannot understand for the golden shower of Jupiter, the fructifying impulse of the higher level to which it responds in the fulness of time. The upward path which prevents each level from running down to dead inavailability is produced by the higher level which thus compensates for the downward trend and makes the whole a moving, living whole. The highest level of all regulates, orders and runs up the lower levels as the artesian pressure at the top makes the water rise towards its source, or, to change the figure, as Maxwell's omniscient demon selects and sorts the unequal velocities of the molecules, atoms, electrons, so as to make energy run up instead of down. We know that the genius of living matter thus winds up the energy of inorganic matter. In an infinite time and in an infinite universe, there is no reason why all the levels should not coexist and interact, though the torch of light of the higher levels is now carried by some, now by others of the material worlds according as they are duly and truly prepared to act as its bearers, worthy and well qualified to be its incarnations, even as thought, in our human economy, is carried now by one set of cells, now by another, but thought itself is continuous. Our spectrum is too short to react upon the whole series of light waves; our human resonators are too limited to respond to but a small part of the world of tones, and so our mind is too limited to respond to but a limited part of the order of the whole with its unique ensembles of energies of all gradations. Perhaps future man, if the race does not

commit suicide through blindness and fratricide, may be able to respond to harmonies that are hidden to us as we are able to respond to things undreamed of by Pithecanthropus. At any rate we may be sure that somewhere such beings exist. And the divinity of the future, of new orders of creativeness, is but the divinity eternally present, incarnating itself into new forms of matter according to a law of its own that we cannot fathom. Our little earth is but an island in the sea of being, surcharged and directed by the genius of the whole.

One thing is certain: the real unit of reality is not our earth, nor even our solar system. There was a time when the individual took himself to be the unit of human life and ruled out everything except what ministered to his limited desires. We have advanced to the point where we regard the nation as the unit of human life, but still show a barbarous indifference, if not murderous hate, towards other nations. We know by tragic experience that our human universe is too narrow to make room for all the real human values. In the realm of nature we were for long geocentric; we have become, for some purposes, heliocentric. We must learn that the cosmos is the true unit of reality. It is true that astronomy has taught us that our earth has no independent existence. It is but a cinder from the sun, depending upon it for its energy. And the sun is but a mediocre member in the society of worlds, a differentiation and concentration of the total stuff of the whole, and owes its energy to it. The spectroscope has taught us that elements and properties are universal. We know that light, radiant heat and gravity are aspects of an electrical continuum in which all worlds float. We know that form or order is as universal as the space and time and energy in which it weaves its harmonies. Yet somehow we imagine that the evolution of our earth is a thing apart. We do not realize that its life is part of the rhythm of the whole; that, not only its energy, but its order and phases are what they are because of the space and time relations and the interactions within the rhythmic whole; that

life and mind on our earth are as dependent upon this interaction as are our gravitational movements. Within the cosmic whole no part liveth unto itself nor dieth unto itself, but it lives and dies in obedience to the life and order of the whole. Worlds, like individuals, have their seasons of budding spring-time, summer bloom, multi-coloured autumn, and grey winter, but the cosmos has all seasons for its own. In the deathless rhythm of the universe the life-giving forms of each level of existence fly like winged messengers from system to system, the higher to the lower, to take effect on those that are prepared, as the moon's silver rays stir the heart of youth to love and tender meditation. What science fails to realize is the spirit that moves over the deeps of seeming chaos, the divinity that streams like light through all, courses like life-blood through the whole, draws like an eternal magnet all to itself.

What we find in the actual world are different levels of energy coexisting and interpenetrating in diverse degrees. This fact is independent of our ignorance of the *modus operandi* of these levels. The universe contains all that our earth reveals and more besides. It is the *plus* which makes motion, evolution, progress, on our earth possible. We cannot refuse recognition to anything that makes itself known to us as having reality, be it electricity, matter, life, mind, spirit. There is no reason for regarding the higher levels in the universe as secondary to the lower. If our bias leads us to consider the lower levels as the sole reality, we come to an *impasse* even in accounting for their behaviour. The reality we know is due somehow to interaction within the cosmos. While the lower furnish the body or instrument to the higher, the latter furnish the vitalizing and orderly touch to the lower. They are thus interdependent. In regarding the lower as the conditions for the manifestations of the higher, we must remember that not only the complexity, but the duration and order of development must be taken into account. The conditions are cumulative. Moreover, the levels are eternal and constant. Without dogmatizing about the

details of exchange, we must hold to conservation, not only for the universe as a whole, but for each level; for if there had been continuous encroachment of one level upon another, this process must have run its course in infinite time. There must, therefore, be compensations in the actions, reactions and interactions of the various levels.

Our universe must make room for all the diversities there are in the concrete world of experience, for the stupid and the brilliant, for the sane and the insane, for the good and the bad, for merry laughter and brooding melancholy, for the quick and the dead. And it must contain all facts in their unique significance and movement. It must contain streams of change, of indefinite diversity, with their respective elements and properties, and their discrete pulsations from the throbbing hearts of the cosmos, multiple histories with their diverse paces, their intersections, their unique durations and significance, with their relative constants making possible characterization and prediction. We also require limpid space as the playground of energies, for we must have distance to spread our stars, and we must have freedom of movement. And we must have consciousness, the neutral light universally present, variously coloured by energy patterns and, in some stages of complexity and intensity, by significance and value—the awareness and “enjoyment” of relations. And we must have order and law, else were the dance of energies the dizzy whirl of the insane.

There is ample room for relativity in the interaction of the parts of such a world even though the order of the whole be eternal. There are not only the blazing spots moving through space at different rates with their changing perspectives of space-time and the curvature of light in the neighbourhood of gravitational fields; but every property, be it in the inorganic, organic or mental field, moves by its own velocity, its own retardation and acceleration, aside from the movement of the unique ensemble of which it is a part. When we deal with such complexes as personal histories, we must take account, not merely



of the external stimuli with their character, velocity, and inter-relations, but also of the still more complicated physiological organism which is the immediate condition of mental processes. The mental processes themselves constitute a highly complicated ensemble, where we must take account not merely of the general movement with its duration and order, but also of the several movements of the constituent processes with their unique character, duration, and interrelations. There should, then, be sufficient opportunity for the exercise of the ingenuity of the most venturesome mathematician, a sufficient basis for all the dimensions that he can desire in even a superficial description of the universe. This, moreover, does not take account of the creative passing of nature, the real future, which must necessarily lie outside the methods of science. We cannot predict the next creative step. We can know only in retrospect, when the step is an accomplished fact. So the cosmic dance whirs on. All are in the dance from the largest sun to the smallest electrons, in all sorts of gyrations, the leaders ever shifting, as in a Virginian reel. Only the order, properties, and levels are eternal.

There must, then, be an eternal hierarchy of levels in the universe. Law and order on the lower levels are due to an interpenetration by the higher levels, even before these can become effective in unique and concrete forms, expressive of their own true character. Such expressions must wait for the proper conditions and the proper stage of development. These levels, with their various types of organization, are not mere abstract forms, as Plato's Ideas, but energy patterns, existing in the concrete and effective in the concrete. The physical bearers or incarnations of this hierarchy of levels vary from time to time. The hot spots of conscious intelligence shift, but the genius of the whole remains the same, ever operative from the highest level to the lowest and back again. In infinite time the standard of realization must somehow be eternal. The perfection we seek must, therefore, exist, energizing and inspiring

those that can respond. Plato's mistake lies in regarding reality as pure static forms and in discrediting the world of matter and motion as phenomenal. But, in such a world, form hangs frozen in the empyrean and remains ineffective, while the concrete world becomes chaotic. The real world is a flowing world, with such order and constancy as makes prediction to a degree possible. But is there evolution in the whole? There obviously cannot be the evolution of new levels, for then we should have the whole problem of something coming from nothing. But if time is real and duration is real, then there must be enrichment within the process, and the process as a whole cannot be regarded as merely circular, as the ancients thought; but must be regarded rather as a spiral, like the recurrent octaves in the musical scale or the recurrent melody in the symphony, with the opportunity of creating ever new symphonies. Out of some eighty elements the chemist can create an indefinite number of compounds. Out of a few thousand tones musical genius can create an indefinite number of tonal harmonies. What cannot the genius of the universe create with its endless variety of material, world without end?

There remains the problem of evil. Obviously no theory of the universe can make the amount of evil in the world less than it actually is, but it can show the place of evil in the whole. We have seen that the world as we know it is a pluralistic world of multiple energy patterns, histories and levels. Evil must show itself in the relation of energy patterns to each other and the whole. It is part of the problem of adaptation. Now each energy pattern adapts itself to, or rather appropriates new energy patterns, by a trial and error process. This is as true on the lowest level as on the highest level of existence. In every such tentative experimentation, whether on the inorganic, organic or mental levels, or in their relation to each other, illusion and error are possible. It is in the realm of thinking and volition that we are best acquainted with such experimentation, but they are

equally real in the other realms of reality. It is of interest that while the Hebrews thought of evil as sin and the Greeks thought of it as error, the Hebrew word for sin and the Greek word for error alike mean missing the mark. We know better than they could know that the target is a moving target, that we are moving as groups and individuals in various lines from each other and the target. But the target must become a common target in order to be effective. The wonder is how we can help missing it. If the universe with its various movements and paces were a world of chance, we could never hope for adaptation; and adjustment, goodness, harmony would be words unknown. But even in a world orderly on the whole there is abundant opportunity for conflict. The conflicts arising may be internal conflicts owing to defective organization, or lack of adaptation within the complexity of the energy patterns which go to constitute the individual in question, or it may be external conflict due to external relations. In either case there will be groping and error, with eventual success or elimination as a result of the selective process. The adaptation, moreover, is never completed in the changing complexities of the universe, and therefore, the process of trial and error is never finished. There is thus a certain blindness and relativity implied in the very nature of adjustment within a complex changing world. This is what makes the tragedy but also the zest of existence. History is not the mere dialectic staging of forms of thought. Thought itself is relative to history in the concrete, to the infinitely complex movements of an order greater than itself. But in the words of the ancient Xenophanes: "By seeking we can find out better," or at any rate the race can learn through our failures. At best our understanding is relative and limited. The historian selects according to his bias or the bias of the *Weltgeist*, and becomes an optimist or pessimist. But the optimism of one may be the pessimism of the other. The striving for economic equality fills the conservative with foreboding and the radical with

hope. But only the genius of the universe knows the full meaning of it all.

The universe must be regarded as a vast symphony with the orchestral instrumentation of worlds. It is our souls that are dead and irresponsible. We need to awaken with Siegfried to the meaning of the song of birds, the myriad-voiced murmur of the forest, the portent of the north wind making ghostly music in the pines, and the soothing south wind carrying love and languor to the heart, the buds of spring suggesting dreams of love, harbingers of the everlasting cycle of awakening nature, the buzzy hum of bees in summer fields, the yellow leaves of autumn, with the shadow of sadness of approaching death—death which is but the preparation for a new cycle of life, the rhythm of anabolism and catabolism, the systole and diastole of nature's heart. Could we but feel and understand this cycle, we should understand the meaning of the whole. In this cosmic symphony there are the dominant theme and the subsidiary themes—the dominant carried by the worlds which embody for the time being the highest levels of reality, the subsidiary themes carried by worlds in intermediate stages of development down to the lowest, all with varying cadences and each with a movement and figure of its own, but all reinforcing by their unique quality the melody and harmony of the whole, with realistic interlacing of themes, with recapitulation, by various groups of instruments, of the main theme, with relief and contrast, with movements in *dur* and *moll* subsiding to pianissimo and rising to their characteristic crescendo, forms interblending like a delicate pastel drawing, with varying orchestral tinting, but all parts of the effective synchronization of the whole, discords of drums and cymbals somehow drowned and fused in the harmony of the victorious movement, rising in spiral periodicity in infinite time, with wholes embodied in larger wholes, but the harmony of the prevailing theme and of the whole eternal.



*Meeting of the Aristotelian Society at 21, Gower Street, W.C.1,  
on April 4th, 1921, at 8 p.m.*

## VI. SYMPOSIUM: THE CHARACTER OF COGNITIVE ACTS.

*By* JOHN LAIRD, G. E. MOORE, C. D. BROAD, and G. DAWES  
HICKS.

### I. *By* JOHN LAIRD.

I HOPE that our discussion this evening may help to make an obscure matter plainer, and I have undertaken to open it with this object singly in view. Perhaps, therefore, the Society will pardon me for making a personal explanation at the outset. I know that I have simply purloined most of my ideas on this important question, and that I have damaged them in transit and assembled them clumsily. What is more, I feel very acutely that I am confident, often, where I should be cautious, and diffident where I should be bold. It seemed to me, however, that I might achieve my aim by simply exhibiting these shortcomings. A dubious and exposed position offers a very pretty target, and I hope that the rigorous criticism which I am inviting may instruct others as well as myself.

If I were to try to convince a sceptic of the existence of cognitive acts, I should point, in the first instance, to certain palpable matters of fact, and in doing so I should also consider myself able to indicate something of the character of these acts. It is clear, I think, that a man may apprehend things which are not contemporaneous with his process of apprehending. He may think, now, of his late unhappy soldiering, or of something which, like a geometrical truth, is, strictly speaking, timeless. From this and similar evidence, it is plain that our processes of apprehending are events or parts of events. They are always temporal occurrences with a temporal date. It is also plain that these cognitive events may refer to objects

which are not themselves cognitive events at all. Indeed, as it seems to me, unless we adopt the really desperate expedient of supposing that the things of which we think are only "meanings," "aspects," or "modifications" of these cognitive events, or unless we perish miserably in the forlorn enterprise of the "correspondence theory," we are bound to report the facts in this way.

Anyone who grants me this will find it hard, I think, to refrain from assenting to certain further statements to which I now proceed. As we have seen, cognitive events are always temporal, and yet they may apprehend timeless things. Accordingly, when there may be a difference of this magnitude between the process of apprehending and the thing apprehended, it is highly improbable that there need be any close or distinctive resemblance (to say nothing of identity) between cognitive events and their objects. These drivers of fat oxen need not themselves be fat. It is clear, in brief, that a cognitive event might apprehend spatial things if it were non-spatial, or non-spatial things if it were spatial, that it need not be blue or bluish when aware of blue, and so on.

Again, when I chose certain differences in point of time to prove that, in certain cases, the cognitive event is manifestly a distinct existence from its object, I did not mean to suggest that this distinction could be found in these cases only. On the contrary, I took these instances to be peculiarly obvious cases of a quite general type of division, and I have the right to demand, at least, that if this analysis is not quite general, special reason should be shown to the contrary when it is held not to be. I see no reason for holding that act and object are not always different even when they are contemporaneous, and I should not be at all disturbed if this distinction were less obvious in some cases (say in the case of perceiving) than in some others. If anyone were to assert that this distinction holds, let us say, of judgment and not of any other mode of apprehending, I should reply that I see no reason for ascribing

the distinction to judgment and *also* for refusing to ascribe it, say, to remembering or to perceiving. There is no way of showing, I think, that the distinctive peculiarities of judging, or of any other piece of apprehending, imply such a radical and startling difference in this most crucial respect.

This information, to be sure, is exceedingly meagre. On the other hand, it is relevant. Before attempting to supplement it, however, I should, perhaps, attempt to remove certain possible misunderstandings concerning the words I am using. Let me explain, then, that by a "cognitive act" I mean, solely and quite simply, the "cognitive events" or the "processes of apprehending" previously mentioned, and that in particular I do not mean to impute "activity" to these acts in any special sense of that most disputable term. And I mean by an "object" any thinkable entity or connexion of entities—this and no more.

Any inquiry into the character of cognitive acts must consider most scrupulously whether we are directly acquainted with them, or whether we only infer their existence. In the latter case our plight, argumentatively, is very unfortunate. It is very unlikely that such an inference could ever be coercive; and if the very existence of cognitive acts is only a hypothesis divined to explain the phenomena, the ascription of a specific character to the acts is almost certainly an additional, and therefore a less probable, hypothesis. An argument of this kind, consequently, is very cumbrous and very hard to establish; and it is very ill suited to impress anyone who denies the existence of cognitive acts on the ground that they are "mystical" entities, that is to say, non-entities. I shall try to show, then, that we are acquainted with cognitive acts directly.

It is plain, surely, that there may be very different cognitive attitudes towards precisely the same object. For example, we may at different times believe, doubt, and reject precisely the same proposition. *Ex hypothesi*, these differences are not found in the object. For it is the same. These differences belong to



the cognitive attitudes and we are acquainted with them as firmly and as immediately as with the difference between hoping and fearing, or between sour and loud. If this is mystical, let us all be mystics. It is better to be mystical than blind. Again, when we are told, for example, that the clearness of an object varies with the attention that we bestow upon it, what conceivable ground would we have for asserting this (approximately) concomitant variation if we were not directly acquainted with both of the terms which vary?

To be brief, we could not recognize these differences in cognitive acts and attitudes (as we plainly do) without being able to recognize the things which are different, *i.e.*, the acts themselves and some, at least, of their features. The manner of this knowledge, to be sure, raises many controversial issues, and I would discuss these very willingly. But that would be a digression, I think. I am content if it be granted me that we are directly acquainted with our cognitive acts, at least in sufficient measure to distinguish their principal varieties.

This conclusion, I think, should not be flouted or held to be suspect even if it be true that our acquaintance with cognitive acts does not enable us to characterize them very fully. Acquaintance with anything is seldom, if ever, exhaustive acquaintance, and no one should be surprised in any given instance if his acquaintance is less penetrating than he would like it to be. To speak metaphorically, our cognitive acts might very well have a microscopic, or an ultra-microscopic, constitution; and we might have no microscopes for them—only eyes.

On the other hand, it seems reasonable to argue that if our acquaintance with cognitive acts does not reveal any of the properties which we know (on grounds of theory) to be essential for setting about any serious piece of cognitive business, then these acts, for all we can show to the contrary, may be thoroughly useless and otiose existences. Even if cognitive acts exist, I may be told, they have nothing to do with any

genuine problem in psychology or in the theory of knowledge. For, certainly, they do not execute; and they are so dim and spectral that it is impossible to say whether or not they play a part of any importance in the executive process, say, of remembering or perceiving. Indeed, it may be argued with great show of plausibility that we never use them in our explanations, and never mention them except nominally and perfunctorily. All our explanations, we are told, are in terms of objects or presentations, not of acts. Let us, suppose, for example, that I try to make clear to myself why, at this moment, I am thinking of a partial eclipse of the sun. The reason, I may say, is that the sun is setting now in a ruddy sky, and that there was a partial eclipse of the sun on the last occasion on which I observed this peculiarly vivid tint in the heavens. If that is my "explanation," where do acts come in? I see the sun at this moment because of certain physical facts and because of my nervous system, and I recall the eclipse because of the similarity between that particular object in the past and the present fact which pours into my mind. To be sure, I speak of associating these events in my mind, and there would be some point in this explanation if, so to speak, I could see what I was doing. If this act of perceiving and this act of remembering were discernibly similar (and discernibly different from other acts of perceiving and remembering), I could then give a genuine (and not merely a nominal) explanation in terms of my own associative processes. In fact, however, I am quite unable to do anything of the kind. My cognitive acts may *have* these specific differences, but if they have, I cannot discern them.

If this be the complaint, it can be met. For the principal assumption of the argument is needless. Logic does not require us to assume that cognitive acts could not perform their proper and peculiar cognitive functions unless they always had some specific qualitative property which corresponded precisely with each specific difference in the object. Our view is that when

anything not only *is* but also *appears*, there is a cognitive event which apprehends it. It does not follow, however, that there are always two acts when there are, in any sense, two objects, or that our acts have the same kind of complexity as their objects, or anything of the kind. On the contrary, cognitive events have their own sort of complexity. Our cognitive attitudes, as we have seen, may differ, although the object is the same; the same cognitive acts, perhaps, may refer to a wide range of objects having very different features, times, and places (or placelessness); and it is possible, even, that what we call "acts" are only the salient *foci* of temporary stress in a continuing process—the sort of process which we commonly call a mind.

In a word, anyone who believes that our acts have the complexity and connectedness which is needful for them in their business of knowing should not hesitate to admit that there is no way of showing by general logical principles how great, or of what kind, this complexity must be. Acts cannot be superfluous things, for the sufficient reason that nothing in the way of knowing goes on without them; and we should not be astonished if it is true, in fact, that all our explanations of association and the like deal with features of the associated objects—with hints, so to speak, on which the mind may fasten. Apprehension is impossible without an object. It tries to follow objects and to interpret them. If we are able to describe its habits when it finds and when it follows up its discoveries, we have done enough to satisfy any reasonable person.

Still, there are other difficulties. It is commonly argued, with considerable pertinence, that the line of argument I have followed hitherto speedily loses grip of realities because it sets out with far too narrow a conception of the case. The cognitive *qualé* in a process of apprehending, I may be told, is, after all, only one single element in an enormously complicated psychophysiological process, and the greater part of our evidence in these matters is derived, not from our acquaintance with

cognitive acts, but from a host of other sources. What we should try to do, therefore (it is said), is to fuse our evidence together into a single working conception, and neglect all the niceties which, as we readily observe, cannot lead us very far towards the solution of this general (and genuine) problem.

I do not wish to deny the legitimacy of this point of view. It is the right way of proceeding, I am sure, in anthropology, or in social theory, or in any other study whose primary purpose is to sweep all the relevant features of human action into its net. For my own part, however, and in this special connexion, I should like to be more patient with the facts, and, as I think, more radically empirical. This attitude surely is *also* legitimate. No one who agrees with me, I am sure, has the least desire to deny the connexion between cognitive acts and the nervous system, or, again, between cognitive acts and the semi-conscious, or the demi-semi-conscious, or the semi-demi-semi-conscious, *et id genus omne* down to plain, drab, blank unconsciousness. None of us, again, is insensitive to the fascination of the "identity-hypothesis," the "insertion-hypothesis," and the rest, but we have the right to hold that we are better able to appreciate the value and the legitimacy of these conjectures if, in the first instance, we describe the facts which we believe ourselves to have found with as much exactitude as we can attain, even to the point of refraining from speculation. If so, it does not matter whether our researches carry us a long or a short way. Perhaps, even, we should be prepared to bury hope as well as prejudice.

Plainly, there is at least one respect in which our inquiry craves for a further step towards completion along its own lines. Our acquaintance with cognitive acts also reveals part of their non-cognitive setting, and, in consistency, we must accept these tidings as well as the rest of our evidence. It is abundantly clear, in a word, that cognitive acts are not alone in their own house. They are *Erlebnisse* among other *Erlebnisse*, part of an experienced tissue in which our emotions, our moods, our acts

of will, our desires, and our strivings also occur. Whatever can be discovered from these sources, therefore, whether by acquaintance or reasonable inference, is open to us without any question in all these inquiries, and I feel that the course of my argument hitherto may have suffered in persuasiveness simply because I have tried to restrict myself to cognitive acts as rigorously as I could.

Indeed, it may even be argued that this source of evidence carries us further than most philosophers have supposed. According to an eminent modern writer, my cognitive acts are really conations. They are a kind of doing, and I am, in fact, acquainted with them in this character. What is more, this doing is a "movement" with a certain "direction," and it is woven into a pattern of other connected doings. These patterns and directions, it is true, have an air of strangeness because I am not acquainted with cognitive patterns and directions in precisely the same way as with other patterns and directions. On the other hand, they are at least spatial and they occur within my head, so that, despite the peculiarities of the way in which they come to me, I am bound to suppose that they are really neural patterns and directions occurring and revealing themselves whenever the neural process within my head becomes conscious. Hence, according to the theory, we can infer two things of immense importance. In the first place, although our cognitive acts do not differ qualitatively in referring to different objects, they have always a specific pattern which varies, appropriately, as the object varies; and this circumstance resolves one of our earlier difficulties. In the second place, just because these conscious patterns are simply and solely neural patterns which have become conscious, the whole psycho-physiology of the process is manifestly one and indivisible. And so we are at liberty to draw upon all the evidence we can collect from this most extensive source.

For myself, I must confess that this account of the facts

does not appear to agree with my own experience. I have tried very hard, but I cannot find any spatial pattern or direction in my cognitive acts; and instead of movement I find nothing but process. According to this theory, most of the movements and patterns which we all find, such as kinæsthetic sensations and certain other organic sensations in the scalp, the throat, and the glottis, are expressly stated to be different from cognitive acts since they are features of my body and not my process of apprehending anything inside my body or outside it. Here I agree. As it seems to me, "internal" sense-data have the same kind of relation to my sensing as "external" ones. I agree, also, that I can detect (although excessively vaguely) something that can be correctly described as movements *within* the head, and distinguished from the sensations on the periphery. I think, however, that the movements at the periphery are simply the continuations of the movements whose beginnings are sensed, very vaguely, *within* the head; and therefore I cannot believe that their status is radically different. I cannot even imagine how a movement could be cognitive (and, for that matter, aware of distant objects in time and place) so long as it is merely incipient, and yet become an unconscious, irrelevant thing as soon as it acquires sufficient momentum to reach (not distant objects), but the inner surface of the body.

Thus I feel myself compelled to forgo all the advantages that might seem to be attainable along these lines, and if I jib at this bridge I am not very likely to be satisfied with any of the clumsier ferries in the neighbourhood. Frankly, I cannot think that either the character of cognitive acts, or the character of neural process as we know it, enables us to make important deductions in psycho-physiology. Whatever inferences we draw in this connexion, I think, must be based upon similarities and connexions of function. There is no similarity of properties worth the name.

## II.—By G. E. MOORE.

PROFESSOR LAIRD repeatedly speaks as if the very existence of cognitive acts might be doubted. And that he does so rather puzzles me, because it seems to me that if we use the term in the sense in which, as I gather, he himself intends to use it, then that there *are* entities having the property which he would express by "is a cognitive act" is not at all doubtful, and has not, so far as I know, been doubted by any one. No doubt the term "cognitive acts" may be used in other senses, such that it is really doubtful whether there are such things at all. But, in this particular sense, it seems to me that there can be no doubt at all as to their *existence*; the only possible doubt is as to their nature.

The sense in which I suppose him to intend to use the term, and in which I intend to use it, is this. The expression "is a cognizing" may, it seems to me, quite clearly be used in such a sense, that if it is true of any time that anybody is cognizing anything at that time, then it strictly follows that a cognizing exists at that time. And if we mean by "a cognitive act" absolutely no more than we mean by "a cognizing," in this sense, then it is absolutely certain that there are cognitive acts. For that there are cognizings is something which cannot be denied without denying that anybody ever does cognize. And that people do cognize is something which cannot be denied without denying that anybody ever sees, anybody ever hears, anybody ever remembers, etc., etc.: provided, again, we are careful to use "cognize" in the sense in which what is meant by "I am cognizing" is something which certainly follows from what is meant by "I am seeing," or by "I am hearing," or by "I am remembering," or by any one of numerous other expressions, instances of which can easily be given by anybody. There undoubtedly is a sense of "cognize" such that what is meant by "I am cognizing" does follow from what is meant by *each* of these different expressions, just as what is meant by

"This is coloured" follows strictly from what is meant by *each* of the expressions "This is red," "This is blue," "This is green," and a large number of other expressions, of which again anyone can easily give instances. That people do cognize (in this sense, whatever it may be) is therefore as certain as that they see, or that they hear, or that they remember, or that they do any one of a large number of other things which they undoubtedly do do. And that people do do some of these things, from their doing of which it follows that they cognize (or, if we allow for the possible existence of solipsists, that at least *one* person does), is not only indubitable, but has, so far as I know, never been doubted by anyone. The only doubts have been as to what exactly is meant by saying that they do them.

The sense in which I am going to use the term "cognitive acts" is, therefore, one in which that a cognitive act exists now is something which strictly follows from the mere fact that I am now seeing this sense-datum. What this sense is, I don't pretend to know for certain; the question what it is, is part of what I am going to discuss. But there is absolutely no doubt upon the point that it is a sense such that in *that* sense cognitive acts do exist. The sort of question as to which there is doubt can, I think, be put in this way. There is absolutely no doubt that I am now seeing this sense-datum; that is to say, that what I express by those words (whatever it may be) is something true. And it seems to me quite clear that to say that I am now seeing it is the same thing as to say that an entity which is *a* seeing of it, and which is mine, does now exist. In this particular case there is no doubt that there is *only one* such entity, which we may, therefore, call my present seeing of it. If I had been seeing double, there might have been a doubt whether there were not two seeings, each of which was a seeing of mine, and each of which was a seeing of the same sense-datum. But I am not, in fact, seeing double. Hence in this case there certainly does exist an entity which can be called my present seeing of this sense-datum. And this entity is



undoubtedly a cognitive act, in my sense of the term, just because it is a seeing. But what sort of an entity is it? That is a question which it seems to me extraordinarily difficult to answer, mainly because it is so difficult to discover exactly what it is that I am knowing when I know that I am seeing this. But I will do my best to say what sort of an entity I think it is, and why I think so.

The first and most fundamental question we have to face is, I think, the question: Is it possible that my present seeing of this sense-datum is just simply identical with this sense-datum itself? This is a question which Professor Laird raises in the general form, "Are cognitive acts always distinct existences from their objects?" and his argument in favour of the position that they always are seems to consist of two steps. He urges first that there are cognitive acts which have objects which are past at the time when the cognitive act occurs, and cognitive acts which have objects that are timeless; and that in these cases it is clear that the object in question cannot be identical with the act which is cognitive of it. And as regards this first step I am in complete agreement with him. But all that this first step proves is that, in the case of objects which are cognized *in certain ways*, the object in question cannot be identical with any act which is cognitive of it *in that particular way*. It does not show that there may not be *other* ways of cognizing, such that an object which is cognized in one of these other ways *may* be identical with an act which cognizes it in that way. A second step is required to disprove this. And Professor Laird's second step seems only to consist in the argument that there is no reason to suppose that any way of cognizing differs from any other way in such a radical respect as this. This second step, I must confess, does not seem to me very convincing. It does seem to me possible that we should have come to call both remembering and perceiving (in the sense in which we perceive sense-data) ways of "cognizing," even if it were true that, whereas nothing that is remembered is ever identical with an

act which is a remembering of it, yet every sense-datum which is perceived always is identical with any act which is a perceiving of it. What does seem to me to be true is that if, in the case of every sense-datum which is perceived we can show that it is always distinct from any act which is a perceiving of it, we may then safely conclude that the same is true of every object which is cognized in any way whatever. In other words, it is only in the case of "perceiving" in this particular sense, that it seems to me at all plausible to suppose that we have a way of cognizing, such that an object cognized in that way always is identical with any act which is a cognizing of it in that way. I shall, therefore, give the only argument which seems to me conclusive in favour of the view that a perceived sense-datum is never identical with any act which is a perceiving of it; and shall assume that what is true, in this respect, of this way of cognizing is true of all others.

My argument is this. It seems to me that, if we attend carefully enough to the facts, it is possible to discover that what we mean by "seeing" in the case of a sense-datum (and the same holds for any other species of perception in the sense we are concerned with), is something such that it cannot be true of any time that I am at that time seeing a sense-datum, unless it is true that I am *also* at the same time cognizing an entity *other* than the sense-datum in question. When I say that I am now seeing *this*, it seems to me I am certainly saying not merely that *this* exists now, but am also saying, with regard to a certain kind of character, that *this* is appearing to me to have *some* character of that kind. I am, for instance, saying with regard to the *kind* of character which we express by "is a colour," that this sense-datum is appearing to me to have *some* character of that kind—that is to say, *some* character which is a colour. One thing which distinguishes what is meant by saying of one sense-datum that it is "seen" from what is meant by saying of another that it is "heard," is, it seems to me, quite plainly this: namely, not

merely that the former actually *is* of some particular shade of colour, whereas the latter has no quality, which is a colour, at all, but only some particular quality of the kind which we express by saying that it is some kind of *sound*, but that there is some shade of colour which the former is actually *appearing to have* or *is given as having*, while of the latter we are saying similarly that there is some particular sound-quality which it is *appearing to have*. For my part, it seems to me that it may reasonably be doubted whether, in order that a sense-datum may truly be said to be "seen," it is necessary that it should actually *have* the particular shade of colour which it is given as having, or indeed should be coloured at all. But the point I want to insist on is that, even if it is necessary that it should *have* some particular shade of colour, this is certainly not sufficient: it is certainly also necessary that there should be some shade of colour which it *appears* to have. In the case of all the other senses similarly, it seems to me plainly necessary that, in order that a sense-datum of any one of them may be truly said to be perceived, there is, in each case, some kind of character, such that the sense-datum must not merely have but must *appear* to have *some* character of that kind.

But, if this is so, then it seems to me to follow that, in order that any sense-datum may be truly said to be perceived at a time, it is plainly necessary that there should hold, at the time in question, between it and some *character* (that is to say some *universal*), some relation, belonging to that class of relations which can be said to *hold at times*, or (which comes, I think, to the same thing) the class of relations which are such that the holding of any one of them between a set of entities constitutes an event or occurrence: namely, *either the* relation which we express by saying of any sense-datum *A* and any character *p*, that *A* is *appearing to have p* (in the particular sense in question), or *some* relation of a kind such that in saying this we are saying that *some* relation of that kind is holding between *A* and *p*. In other words, it seems

to me clear that my present seeing of this sense-datum is an event which consists in the present holding of a relation of a certain kind, between this sense-datum on the one hand and a character on the other: the relation being such that whenever a relation of that kind holds between a sense-datum and a character at a certain time, it follows that *both* the sense-datum *and* the character are (though in different ways) cognized at that time. To say that any sense-datum is seen at a time, seems to me to imply that some relation of this kind is holding at that time between it and a character; and hence the assertion that it is seen cannot possibly be identified with the mere assertion that it exists, nor any event which is a seeing of it with the sense-datum which is seen in that event. But this is the *only* cogent reason I can find for asserting that my seeing of this sense-datum is something other than the sense-datum itself. In other words, the only entity other than the sense-datum itself, which it seems to me must necessarily exist at any time at which a sense-datum is seen, is an event which consists in the holding of a certain relation between the sense-datum and some character. And since a cognitive act, which is a seeing of the sense-datum, must exist in every such case, it seems to me we must identify such a cognitive act with an event of this kind.

Of all cognitive acts without exception I want to maintain what I have maintained with regard to my present seeing of this sense-datum, in the following respect: namely that all, without exception, are events which consist in the holding of some relation of a certain kind between two or more entities, all of which are objects that are cognized in the act in question. Thus my view involves, in the first place, that in the case of no cognitive act whatever is there any object which can be properly spoken as *the* object of the act in question: every cognitive act *must* have at least two objects, and each, so far as I can see, may actually have many more than two. Language is very commonly used which implies not merely the

contradictory but the contrary of this proposition. People speak as if, not merely in the case of some cognitive acts, but in the case of every one, there were some object which could properly be spoken of as *the* object of the act in question. Professor Laird himself, in one place, uses such language, when he says "in certain cases, the cognitive event is manifestly a distinct existence from *its* object." But I do not think he would defend this language; since later on he says "It does not follow that there are always two acts when there are, in any sense, two objects," *i.e.*, he admits that, in certain cases, one and the same act *may* have two objects, and what he admits to be possible in some cases, he would, I imagine, admit to be at least *possible* in all.

But though I hold that every cognitive act is an event in which *some* of its objects are constituents, I do not hold that *every* object of a cognitive act is a constituent of the act in question. I hold, for instance, that some of the objects which I cognize are known to me only *by description*, in the special sense which Mr. Russell has given to that phrase. And in the case of objects known only by description it seems to me quite plain, that, though, so far as I can see, they may possibly in certain cases happen to be constituents of an act which is a knowing of them by description, yet they are not *necessarily* so, and in most cases are, in fact, external to the act. But it follows from the definition of knowledge by description that every act which is a knowing by description is *also* cognitive of other objects, which are *direct* objects to it; and these other objects are, I should hold, all of them constituents of the act.

This view that every cognitive act is an event in which some of its objects are constituents, and an event which actually consists in the holding of some relation of a certain kind between some of its objects, is, I think, very commonly denied by people, who yet agree with me in holding that every cognitive act is always other than any of its objects. It is, I think,

very commonly held that nothing which is an object of a cognitive act is ever a constituent of the act in question. Thus it would be said that my present seeing of this sense-datum is something which exists at this time, but of which neither this sense-datum itself nor the character which it appears to me to have are constituents, although it is cognitive of them, and although it has a "content" corresponding to each of them. And what I want to urge against this view is simply that there is absolutely no reason to believe in the existence of any such entity. My present seeing of this sense-datum is something the existence of which follows from the fact that I am now seeing it. But, so far as I can see, the only thing which does follow from that fact is the present holding of a relation of a certain kind between this sense-datum and some character. I am willing to admit that the relation in question may possibly be one which consists in their both being related in a certain way to a third entity, which is what I am now calling "I" when I say that *I* am seeing this; though it seems to me possible that what I call "I" is nothing other than the event which consists in the relation holding between them, on the lines of James's view that the present thought is the only thinker. But even if there is such an entity, other than the event which consists in their being related in a certain way, which is what I am calling "I," I can see no reason for supposing that this entity deserves for any reason whatever to be called "my seeing of this," or to be called a cognitive act, or that it has any "content" corresponding to the objects which I am cognizing; whereas the event which consists in the holding of a certain relation between it *and* this sense-datum *and* the character which this sense-datum appears to me to have, certainly will deserve to be called "my seeing of this sense-datum." It seems to me that Professor Laird, though he says nothing explicit on this point, must have been adopting the view that a cognitive act never has any of its objects for constituents, where he suggests that there is no reason to assume that cognitive acts



"always have some specific qualitative property corresponding precisely with each specific difference in the object." I understand him to mean that where, *e.g.*, a sound appears to me at first very loud and then to die away, there is no absolute necessity to suppose that the cognitive act in which it appears to me to be loud is qualitatively different from that in which it appears to me to be faint. But obviously, if the absolutely specific character which it appears to me to have, in the one case, and the different absolutely specific character which it appears to me to have in the other, are constituents respectively of the two acts, it is absolutely necessary that the two acts should be qualitatively different.

### III.—By C. D. BROAD.

THE form of our question seems to presuppose three points as agreed by everyone: (i) That there are cognitive acts; (ii) That there is some characteristic common to all of them, but presumably not confined to them, in virtue of which all are called "acts"; (iii) That there is another characteristic common to all of them, but peculiar to them, in virtue of which they are called "cognitive" and distinguished from other kinds of "acts." Then we might ask ourselves (a) What is understood by an act? (b) What is meant by "cognitive"? Is it something that can be analysed and defined or can we merely point to typical instances of it? (c) Is there any reason to suppose that there are such entities as "cognitive acts" in these senses of "act" and of "cognitive"? and (d) If so can we find any characteristics common and peculiar to cognitive acts beside the fact that they are cognitive?

As regards (c) Professor Laird holds that it is possible to doubt the existence of cognitive acts, but that this doubt can be removed by reflection and argument. Dr. Moore holds that in a certain sense of "cognitive act" there can be no doubt that

such things exist. Since no sane person could doubt that cognitive acts, in Dr. Moore's sense, exist; whilst Professor Laird holds that some persons actually have doubted the existence of cognitive acts; it is pretty clear that Professor Laird does not mean by cognitive acts what Dr. Moore means by them. Now I agree with Dr. Moore that it is highly desirable to start our discussion with something that everyone agree exists. And the only way in which we can do this is to define by extension what we are going to discuss. Dr. Moore says that he means by a "cognitive act" something which exists whenever anyone sees or hears or tastes or . . . anything. If we attempt to define or describe cognitive acts by intension, i.e., by stating certain characteristics which we hold to be common and peculiar to them, it is practically certain that someone or other who is as sane as we are will doubt or disbelieve that such things exist.

I think the cause of the apparent difference of opinion between Professor Laird and Dr. Moore as to the possibility of doubting the existence of cognitive acts arises simply because Professor Laird defines them by intension and Dr. Moore by extension. It is perfectly obvious that Professor Laird has at the back of his mind some definition of "acts" by intension, and he holds that some people—I think, *e.g.*, he has the Behaviourists and the Neutral Monists in view—would not agree that anything in the world answers to his definition. If these people could prove their contention to him I take it that Professor Laird would say: "Then there are no cognitive *acts* in my sense of the word." The unfortunate thing is that in his paper Professor Laird never has stated what he understands by a cognitive act; he has told us various things which he believes about them, but has not made it clear whether all of them are additional *truths* about cognitive acts in his sense, or whether some of them are part of what he *means* by a cognitive act.

We are, therefore, brought to our question: (a) What is under-



stood by an act? Professor Laird seems to me to have a good excuse in the customary usage of language for thinking that there is a more or less agreed definition of "acts" in the sense in which we talk of "mental acts." And he is justified by historical facts in thinking it possible that some persons might doubt whether anything answers to that definition. Of course Dr. Moore has a right to define what *he* is going to mean by cognitive acts so long as he keeps to his definition throughout his argument, as he does. And everyone admits that cognitive acts exist if the phrase "cognitive act" is just a general name for seeings, hearings, smellings, remembering, etc. But most people would call these admitted entities "cognitions," and would hold that to call them "acts" is to go further and to imply that they can and must be analysed in a certain special way or set of ways. The general mode of analysis presupposed by the use of the word "act" would seem to be somewhat as follows. Taking "my seeing *x*" as a typical cognition, it is called an act if, and only if, it be analysable into a mental term, a certain dyadic relation, and *x*. There is a good deal of ambiguity as to how this analysis is to be performed, and this leads to certain further ambiguities in the use of the word act. Some people would analyse "my seeing *x*" into (I)—seeing—(*x*). In that case, so far as I can make out, the whole complex bound together by the relation of *seeing* might be called an act. On that analysis and with this sense of "act" the object *x* is a constituent of 'the act. But, with the same analysis, I think that some people would call the relation of seeing an act, and not the complex as a whole. With this sense of act the object *x* is not a constituent of the *act*, though it is a constituent of the *cognition* which is "my seeing *x*." Again, others would analyse the same cognition into (my seeing)—of—(*x*); and, of course, there might be endless further differences of opinion as to how, if at all, the apparently complex entity "my seeing" is to be analysed. On this analysis I understand that the entity called "my seeing" would count as the act. And on this view again the object *x*

would not be a constituent of the act, though it would be a constituent of the cognition. The point of agreement seems to be that we must only talk of cognitive *acts* if a cognition can be analysed in some way or other into two terms, one of which is mental, and a dyadic relation between them. On one analysis the act is either the cognition as a whole or the relating relation of this whole. On another analysis the act is the mental term in the cognition. And it is only on the first of these three alternatives that the object is a constituent of the act. Now, I cannot be certain which of these alternatives Professor Laird has in mind. But I am sure that he takes the possibility of *one* of these modes of analysis as the definition of an act; and, if all such analyses of cognition should turn out to be impossible, he would, I think, say: "Of course, there are *cognitions*, but there are no cognitive *acts*." He would, I take it, say that, if Dr. Moore's analysis of perception be right, then perceptions are not acts. It seems pretty clear from some of Professor Laird's statements that he tacitly rejects one of the three alternatives that I have mentioned, viz., the view which identifies the cognitive act with the cognition. For this view makes the object a constituent of the act; and he apparently rejects this by implication when he says that the same act can have different objects. So I suppose that he either holds that cognition can be analysed into a mind and an object, and calls the relation between the two a cognitive act; or holds that cognition can be analysed into a mental term which is not a mind (something such as "my seeing") and an object, and calls this peculiar mental term an act.

If I am right the statements that Professor Laird makes about cognitive acts will fall into two classes. Where he is trying to prove against possible objections that cognitive acts exist, what he is really doing is trying to show that cognitions must be analysed in one of the ways that agrees with his tacitly assumed definition of acts. Elsewhere, presumably, he is stating further propositions which he believes to be *true* of all

cognitive acts, but not to be a part of what he *means* by them.

Dr. Moore is surprised that Professor Laird should speak as if to every cognitive act there were some one thing that could be called *the* object of it. But this is not at all surprising if Professor Laird tacitly assumes a definition of act such as I have been suggesting. For an essential part of that definition is the analysis of all cognitions into a mental part and a dyadic relation between it and what is called *the* object. Even if this object be complex, it must be the complex as a whole, and not its separate parts, to which the mental factor is related in the cognition; for otherwise the cognition would not be a dyadic complex, and therefore would not answer to the definition of an act. Thus anyone who believes that cognitions are capable of the sort of analysis that is implied by the phrase "cognitive act" will have to hold that there is something that can be called *the* object of the cognitive act.

Professor Laird's arguments to prove that there are cognitive acts consist in showing that in many cases propositions are admitted to be true of cognitions which are incompatible with propositions that are admitted to be true of the objects cognized. *E.g.*, the cognition is mental, whilst the objects may be physical. Again, the cognitions are in time whilst the objects may be timeless or may have a different date. The first argument does not seem to me to be a very strong one, since it is very difficult to be sure what we mean by physical and mental, and it is therefore uncertain whether the same entity might not be both at once. It is harder to believe that one and the same entity could be both present and past. I know, of course, that in modern physics such things are said, and said truly, of events; but this would not invalidate Professor Laird's argument, because such statements are only made true and intelligible by pointing out that when an event is both present and past it is so with respect to two different sets of events. I should therefore agree that these arguments, as a whole, do

prove with practical certainty that cognitions and the objects cognized are not in general identical. I agree, of course, with Dr. Moore that they do not prove or strongly suggest that in no case can the two be identical. But, even if they did prove this, it were a very short step on the way to proving that they are analysable in the mode required by the act theory. It is *necessary* for this theory to prove that cognition and object differ; since it needs to show that a cognition is a complex of which the cognized object is a term, and this is impossible if the cognition be the cognized object. But it is certainly nothing like *sufficient*. If the cognition be a complex of *any* structure whatever with the cognized objects as terms in it, some things will be true of the cognition which are not true of the cognized objects. We are, therefore, in no way tied down to the particular sort of structure assumed by the act theory, viz., a pair of terms, one of which is mental, the other of which is the cognized object, and a dyadic relation between them.

Granted that there is nothing in mere incompatibility of properties to force us to this analysis, is there anything in the particular properties mentioned by Professor Laird which will necessitate the act theory? Let us consider them in turn:

( $\alpha$ ) The cognition is mental and the objects may be physical. Does this prove that the cognition must contain a term which is mental? Surely not. Why should not a complex as a whole have the property of being mental though it consists of a set of related terms none of which is mental, just as an army has certain properties that belong to none of the soldiers in it?

( $\beta$ ) The cognition may in some sense be present whilst some or all of its objects are past. Now it does seem hard to believe that a complex could as a whole be present while some of its terms were past. And this does naturally suggest that it is not really the cognition, in our sense, that is present. It suggests that the cognition is a complex which cannot strictly be called, as a whole, present or past; but that it is analysable into a present part—the cognitive act—and a past part—the remem-

bered objects. Thus the facts of memory do rather favour the act analysis for that special kind of cognition. Now, if we are forced to this sort of analysis by the facts, it seems to me that we shall be forced to a certain definite one of the various act theories: (i) We must reject the theory that act = cognition, because here it was the very fact that something seemed to be present and this something could not be the cognition as a whole,—containing, as it does, a past constituent,—that forced us to analyse the cognition into act and object. (ii) If it is to be the act that is present, it is difficult to see that the act can be the relation between me and the remembered object. If “my remembering  $x$ ” is to be analysed into “(I)—remembering—( $x$ )” the relation of remembering stretches from present to past, and it is difficult to see why it should be called a *present* act. Thus (iii) if the facts of memory do force us to the act theory at all they would seem to force us to the particular form of the theory which analyses “my remembering  $x$ ” into (my remembering)—of—( $x$ ), and counts the present act as the entity called “my remembering.” The question still remains however: Do the facts of memory force on us an analysis in accordance with the act theory? I think it is certain that they do not. In a memory cognition, if it be granted that the objects remembered are constituents of it, we must grant that something is present and something is past. And it is no doubt difficult to believe that a complex whole could be present if any of its terms were past. It is therefore plausible to suppose that such cognitions are complexes containing some terms that are present and others that are past, related by some sort of relation that stretches across time. But it does not in the least follow either that this relation is dyadic or that the term in such a complex which is present is itself mental. As before it may be the complex as a whole, and that alone, which is mental. So the facts about memory do not force us to any form of the act theory; though, if we choose to adopt the act theory,

they suggest one form of it much more strongly than the others.

(γ) The next special difference between an act and its object is said to be that the one is a particular event with a date in time whilst the other may be a universal. *E.g.*, at a certain moment I can think about the isosceles triangle and its properties. I take it that the argument here again is that this proves that the cognition must be analysable into a constituent which is particular and a constituent which is timeless and universal, and that the former is an act. As before I agree that the facts probably do force us to recognize that the cognition is a complex in these cases, and that some of its terms are particular and others universal. But I do not see that they force us to suppose that any one of the particular terms is as such mental, or that the relation which binds the terms together into the cognition of a universal must be dyadic.

To sum up. Professor Laird's facts and arguments do strongly suggest that certain cognitions are what I might call "heterogeneous complexes;" but they seem to me to throw no light whatever on the constitution of these complexes, *i.e.*, on the nature of their relating relations. And they give no reason to think that one of the terms in such a complex is mental, or in fact that anything is mental except the whole complex cognition. Thus they do not appear to me to prove the existence of cognitive acts in the sense defined by me, and in the sense which it seems to me that Professor Laird tacitly assumes.

I now turn to certain further statements which Professor Laird makes about cognitive acts. He says that they can be detected by introspection, though he argues quite consistently that this may give us but vague information about their details. And he says that if they were not known by introspection the belief in their existence would be rash and precarious. Now my own view is that acts in Professor Laird's sense are not known by introspection, that the belief

in them is founded on inference, and that it is rash and precarious. It seems to me that if anything is known by introspection it is cognitions, and that we do not know by introspection that cognitions are analysable in either of the ways presupposed by the act theory. If this be so, introspection will not tell us either that cognitions as such are acts, or that they contain certain parts which are acts, or a certain dyadic relation which is an act. It is commonly said that the difficulty of introspecting acts is that acts seem to be "transparent" and that when you look for an act you only find objects. Now I take the truth of this to be that the real objects of such introspection are cognitions, and that these are complexes containing certain non-mental terms. What we become aware of by introspection is primarily the complex, and always at the same time the non-mental terms in it, which are called the objects of the cognition. But we do not seem to become aware of any mental term in such complexes, nor at all distinctly of the relating relation. This of course does not prove that in fact cognitions do not contain a mental term nor that their relating relation is not in fact dyadic. But I must confess that my own introspection leaves me absolutely ignorant on this matter. Certainly in introspection I become aware of *something* mental: but my own introspection does not tell me that this is a certain part of the cognition rather than that it is the cognition as a whole. As far as introspection is concerned I see nothing to choose between Professor Laird's tacitly assumed view of the structure of perceptions and Dr. Moore's quite different view. I do not in the least believe that the act analysis is known by introspection; it is just the simplest sort of analysis, and we naturally prefer to start by trying what can be done with two-term relations before passing to more complex theories. If any decision can be made between the innumerable theories of the structure of cognitions which could be put forward and which would all be equally compatible with anything that introspection tells us, I

imagine that it must be made on epistemological grounds. Examples of what I mean are presented by Mr. Russell's penultimate (unless it be now antepenultimate) theory of judgment, and by the theory of perception put forward by Dr. Moore in the present discussion. Introspection does not tell us in the least whether judgment involves a dyadic or a polyadic relation, but the former theory does seem to lead to difficulties about truth and falsehood which the latter in some measure avoids. These epistemological considerations are, I imagine, the sole grounds on which we could choose between a theory of the structure of judgment such as Russell's and a simple-minded act theory such as that of Meinong and his pupils. The same remarks seem to me to apply to Dr. Moore's present view about the structure of perceptions. Introspection seems to have nothing to say one way or the other, and I imagine that the main motive of Dr. Moore's present theory is that he hopes that it will overcome certain difficulties about the nature of the external world and our supposed knowledge of it which are very pressing on the view that sensation is analysable into a two-term relation between our minds, or some state of our minds, and a sensum.

Professor Laird gives other reasons to prove that we do know cognitive acts by introspection. One is that we recognize that we can have different attitudes towards the same object. Evidently his view is that this implies that in the cognition the attitude and the object are distinct factors and that the attitude can be introspectively recognized. But obviously the facts are equally compatible with the view that all that is ever introspected is the cognition as such, that cognitions consist simply of their objects bound together by certain characteristic relations, that the same objects may be bound together by different sorts of relation, and that the different complexes thus constituted appear different to introspection. They do not necessitate the view that the attitude is a peculiar kind of mental term related dyadically to the object, or that it is a



dyadic relation between the mind and the object. And one or other of these views seems to me to be implied by Professor Laird's use of the word "act." My own view of the whole matter is that I am very doubtful whether there is anything common and peculiar to what we call cognitions, except the fact that they are cognitive. And this characteristic, I think, cannot be defined or analysed but can only be illustrated by example. Each special kind of cognition has to be treated on its merits; most of them are almost certainly complex; but introspection gives us practically no guide as to their structure, and nothing but epistemological considerations will enable us to decide between alternative theories about the structure of each kind of cognition. It is probable that even such considerations only cut out a few alternative theories and leave numberless others standing.

Dr. Moore would go one step further than this and hold that probably *all* cognitions are complex. His position is that what he calls "perceptions" are the only cases that could reasonably be supposed not to be complex, and that even in this case we can show them to be heterogeneous complexes containing at least a *sensum* and a universal related by a certain peculiar relation. Probably the strongest case that could be taken of a cognition that might plausibly be identified with its object is a bodily feeling like headache or toothache. To most of us it does seem that a red patch and the seeing of a red patch are different, but it seems more doubtful whether there is any difference between a toothache and the feeling of a toothache. It is perhaps worth while to remark that just in proportion as doubt becomes possible on this point we hesitate to use the word "cognition" and prefer to talk of "feeling." I cannot adequately discuss Dr. Moore's extremely interesting theory of the proper analysis of perceptions, which involves the view that there is a fundamental kind of relation between a *sensum* and a universal, denoted by the phrase "appearing to have some specification of the universal." If there be such a relation it seems

likely that it must be at least triadic, if two people can be aware of the same sensum at once. For a sensum cannot appear to me to have two different specifications of the same universal at the same time, whilst if you and I ever are aware at once of the same sensum, it can appear to me to have one shade of colour, *e.g.*, and to you to have a different shade. Dr. Moore argues that on his analysis, and on that alone, it is certain that a sensum differs from the seeing of it. His argument appears to be that on his view the seeing of  $x$  contains both  $x$  and a universal, whilst the mere existence of  $x$  only involves  $x$ . This does not seem to me conclusive, but I may have misunderstood him. I suppose that any sensum, in fact, has some qualities. If so, the existence of  $x$  does involve a relation of "participation," or whatever you choose to call it, between  $x$  and certain universals. It is a different relation from that of "appearing to have," but it is a relation between  $x$  and a universal. Thus, even if the seeing of  $x$  were identical with the existence of  $x$ , the seeing of  $x$  would be a complex containing  $x$  and certain universals. Hence, to prove that the seeing of  $x$  is such a complex does not suffice to prove that it differs from the existence of  $x$ . The proof of difference must depend, so far as I can see, on the proof that "appearing to have" is a different relation from "having," and that the former characterizes perceptions, whilst the latter characterizes sensa. But I am very probably talking nonsense, and I have no doubt that Dr. Moore will correct me.

#### IV.—By G. DAWES HICKS.

WE are supposed to be discussing the *character* of cognitive acts, but so far the discussion has largely turned on the question whether there are such things. Dr. Moore has, however, attempted to determine what it is that we are entitled to describe as a cognitive act. If I correctly follow his acute and

interesting analysis of perception, I am prepared to go a long way with him. He employs phraseology, it is true, which I should not employ. Where, for example, he speaks of a "sense-datum," I should speak, in conformity with ordinary usage, of a sense object, and the characteristics of such object I should not call objects; but this after all is a matter of little consequence. I have consistently maintained that in an act of perception the object is always complex; that it consists not only of parts but of qualities or properties which are related to it in a specific manner; and this, I take it, is what Dr. Moore is also saying when he insists that "every cognitive act *must* have at least two objects, and each may actually have many more than two." I do not imagine he would contest Professor Broad's assertion that "any sensum has, in fact, some qualities," or that the existence of a sensum involves a relation between it and certain universals. I agree with Dr. Moore likewise that in order that a sense-datum may be truly said to be perceived there is some kind of character which it must not merely have, but must *appear* to have; and I regard his strong insistence upon this point as by far the most significant feature of this symposium. Once more, I do not imagine he would dispute Professor Broad's contention that "appearing to have" is a different relation from "having"; although I, at any rate, would disclaim what Professor Broad seems to think is implied that while the former relation characterises perceptions it is the latter which characterises sense. I see no ground for holding that there is any mode of sense-apprehension other than perception.

My analysis begins to differ from Dr. Moore's when he proceeds to identify a cognitive act with an event which consists in the holding of a certain relation between the sense-datum and some character. In short, I am one of those people to whom he alludes who hold that nothing which is an object of a cognitive act is ever a constituent of the act in question. And, before dealing with the criticism contained in the last

paragraph of his paper, I had better perhaps re-state as concisely as I can the position to which he takes exception.

We are agreed that in the whole situation we are calling perception the cognitive act is always other than any of its objects. But, unlike Dr. Moore, I think this implies that the cognitive act is one term of the relation, and that this term, no less than what I should describe as its object, is an existent entity—whether a state or phase of an entity called “I” or a “thought,” in the sense in which James asserts that the present thought is the only thinker, seems to me, so far as the issue before us is concerned, immaterial. Both these entities—the mental term and the object—not only exist but have some qualities or characters,—what it has been customary to name “content.” And, in perception, what happens, so far as I can discover, is that the mental term is engaged in discriminating the features or content of the object, and in thus becoming aware of those features or of that content. It is, it seems to me, in virtue of its fulfilling the function of discriminating the content of the object that one is entitled to describe the mental term as an “act.” The discrimination attained is, however, never complete; and, consequently, it is, at the best, only a portion or fragment of the content of the object that “appears” or is apprehended. This portion or fragment I denote, for want of a better name, as the “content apprehended.” The content of the act, on the other hand, is not apprehended in the same way; it is “lived through,” or *erlebt*, or, in Alexander’s phrascology, “enjoyed.” Hence the difficulty of deciphering it, especially at the incipient stage; but what it becomes as the function of discriminating proceeds may, I think, be designated, not inappropriately, as *awareness* of the content apprehended. I should like to point out that in all these connexions one is using the phrase “content” quite consistently. The “content” of the object consists of the qualities or characters of the object; the “content” of the mental act consists of the quality or character of that act; and the “content apprehended” consists of such

qualities or characters as the object appears, either truly or falsely, to have.

Dr. Moore's main objection to an analysis of this kind I understand to be that he can find no reason for asserting the existence of what I have been calling the content of the mental act; that, indeed, a mental act of the nature I have indicated, would be a superfluous addition to his own simpler rendering of the facts. I can scarcely expect to convince Dr. Moore; but I may perhaps bring out the sort of reasons that convince me by stating very briefly why I cannot accept what I take to be his account of awareness. (a) The sense-datum and the character it appears to have are both described by Dr. Moore as "objects." Now, "object" is a correlative term; where, then, in the analysis which he offers, is the term with which it is correlative? My seeing of a sense-datum that appears to have the character of red and my seeing of a sense-datum that appears to have the character of blue have evidently a feature, the seeing, in common. And the one common feature which Dr. Moore's analysis seems to reveal is the holding of a relation between the sense-datum in each case and the character which it appears to have. But, in the first place, I have failed to discover in what he says any argument which tends to show, even remotely, that the holding of this relation is the seeing; and, in the second place, I would urge, that the holding of this relation is no less an object, in Dr. Moore's sense, than either the sense-datum or the character, so that it would seem, after all, that, according to the view in question, a cognizing is identical with one of the objects cognized by it. (b) It seems to me that a "way of appearing" presupposes, as the ground of its possibility, not only something that appears but also some entity, other than itself, to which it appears,\*

---

\* Cf. Lotze, *Mikrokosmos*, 7, ii. "Um verständlich zu sein, setzt der Begriff der *Erscheinung* nicht nur ein Wesen, welches erscheint, sondern gleich unerlässlich ein zweites voraus, dem diese Erscheinung zu Theil wird. . . . Und sie ist nie etwas Anderes als das Bild welches diese auffassende Wesen sich seiner eignen Natur gemäss von dem andern entwirft."

or, as Professor Laird expresses it, "when anything not only *is* but also *appears*, there is a cognitive act which apprehends it." The cognitive act cannot, I should argue, consist merely in the holding of a relation between a sense-datum and a character which it appears to have, because a sense-datum cannot *appear* to have a character save to a cognitive act. The cognitive act must first be there before there can be any appearing. Earlier in his paper Dr. Moore himself uses language which seems to imply as much. He speaks repeatedly of a sense-datum as appearing "*to me*" to have some character of a certain kind. It is true that in the later paragraph, to which I am now referring, he tells us that if, as he admits *may* be the case, both the sense-datum and the character it appears to have are related to a third entity, the entity called "I," he cannot find any reason for supposing that this entity deserves to be designated "my seeing of this sense-datum." But what can be meant by a sense-datum appearing *to me* except that *I* am the entity that, in these circumstances, is seeing? If a relation holds between the entity called "I" and this sense-datum and the character which this sense-datum appears *to* the entity called "I" to have, is not that virtually admitting that the entity called "I" is the entity which is aware of the sense-datum and the character which it appears to have? A something labelled "I" that is distinct from and other than the acts which we invariably attribute to what we call "I" would be, so far as I can make out, a perfectly barren and otiose entity, in the existence of which we have no reason whatsoever for believing. (c) The way in which one awareness is related to another in so-called inner experience is totally different from the way in which one sense-datum with its characters is related to another in so-called outer experience. There is, for instance, nothing in the latter, so far as one can discover, corresponding to the links of association and suggestion that hold in the former. In that portion of the *Principles of Psychology* where he propounds the

view that the present thought is the only thinker, James calls attention to the perplexities that result from confusing between "the thoughts themselves taken as subjective facts, and the things of which they are aware," and points out that there is an "affinity" between one thought and another that has absolutely no counterpart in the comings and goings and contrasts of the things thought about.

If what I have said under (b) has legitimacy, I believe a consequence follows which indicates, I am inclined to think, the fundamental difference between Dr. Moore's view and the view which I hope Professor Laird shares with me. I believe it follows that the way in which a thing appears is not itself an existent, in the sense in which either the thing or its characters may be said to be existents. If there be any contrast between the characters which a thing has and the characters which it appears to have, there can, so far as I can see, be only one ground on which it could be claimed that the latter are distinct and separate existents,—on the ground, namely, that appearances are effects resulting from the relation of the actual characters of the thing either to the bodily organism or to the mental entity, whatever it is. I can, however, find no reason whatever for such a hypothesis; on the contrary, there seem to me to be very strong reasons against it. Dr. Moore regards it as doubtful whether, in order that a sense-datum may be truly said to be seen, it is necessary that it should actually have the particular shade of colour which it appears to have, or indeed should be coloured at all. If, then, A appears to *have* the character *p*, and if *p* be an existent, it is obvious, I take it, that the relation which A appears to have to *p*—the relation, namely, of *having*—is not an actually existent relation; and that, if A is related to *p* at all, the actual relation is different from what it appears to be. In any case, therefore, Dr. Moore would have to allow that there are some appearances which are not existents; and I do not see what intelligible explanation he could give of these on the view he has presented to us. Moreover, if *some*

appearances be not existents, is it not, following a line of reasoning which he himself adopts, at least *possible* that all are not?

If the argument (c) be valid, it can, I should suppose, hardly be disputed that a cognitive act must have a specific "content," or character, of its own. The conception that blue is a constituent or part of the awareness of blue, or that what is attended to is a constituent or part of the attending, is, I confess, a conception to which I can attach no definite meaning. I should have thought that even if a complex of non-mental terms and relations gives rise, as Professor Broad suggests, to the property of being mental, yet still the relation of this "property" to its objects would *not* be the relation of whole to parts. And when Dr. Moore contends that there is "absolutely no reason to believe in the existence" of a cognitive act's content, I should reply that there is, in the first place, the same kind of reason which he gives for believing in the existence of the entities which he takes to be cognized in perception,—namely, that, if we attend carefully enough to the facts, it is possible to discover that what we mean by the awareness of *x* is not something of which *x* itself is a constituent, however true it may be, and is, that *x* is related to the awareness. But I should urge, in the second place, that the psychological facts of association, assimilation, retentiveness, memory, and imagination, to say nothing of the considerations which James emphasises in his chapter on *The Stream of Thought*, supply reasons in abundance for the view which Dr. Moore would so summarily dismiss.

Professor Broad allows that if the phrase "cognitive act" be just a general name for seeings, hearings, smellings, rememberings, etc., there can be no question as to the existence of "cognitive acts." He thinks, however, that most people would call these admitted entities "cognitions," and would hold that to call them "acts" is to go further. But would they? It would seem, at any rate, a curious perversity of



ordinary speech that the active participle should thus be consistently employed and yet without the implication that the entities so denoted are "acts." And why "cognitions"? The substitution looks suspiciously like getting over the force of an admission by what Mr. Bradley has somewhere decried as "the sliding use of a word." The woeful ambiguity of the term "cognitions" is only too strikingly illustrated by Professor Broad's own employment of it in his subsequent argument. It signifies for him sometimes cognizings, sometimes objects cognized, sometimes complexes comprising both, and sometimes complexes which as wholes are cognizings. And the consequence is that for Professor Broad the only sense of the term "cognitive acts" in which there can be no doubt that such things exist is a sense in which it is doubtful whether these things are "acts."

Three alternative modes of analysing "cognitions" are indicated by Professor Broad as possible for those who are serious with the notion of cognitive acts; and he is sure that Professor Laird takes the possibility of *one* of these modes of analysis as the definition of an act in this context. I cannot speak, of course, for Professor Laird, but I am fairly certain that, so far as he is concerned, no trouble need have been expended upon the first two of them. Professor Laird will agree, I think, (i) that the object is not a constituent of the act, and (ii) that, although there must be a relation, or relations, between the act and the object, the act itself is not a relation. But I should equally reject the third alternative according to which "cognition can be analysed into a mental term which is not a mind (something such as 'my seeing') and an object," the peculiar mental term being an act. Doubtless the cognitive act is not, even during the time of its occurrence, the whole mind; but those who maintain what Professor Broad calls the "act theory" would certainly say that it is a state or condition of the mind, and I do not know that any one of them has ever supposed that the mind is one thing and its states or conditions

something separate from it. That, however, is not all. Professor Broad repeatedly represents those whom he is opposing as pledged to the position that a cognition is to be analysed into two terms, one of which is mental, and a dyadic relation between them. Even if the object cognized be complex, it must, he urges, be the complex as a whole, and not its separate parts, to which the mental factor is related in the cognition; and it must be so because otherwise the cognition would not be a dyadic complex, and would not, therefore, answer to the definition of an act. And it would seem to be his main objection to the "act analysis" that a simple dyadic relation is not adequate to the facts. I should contend, however, not only that the view I am defending is uncommitted to any such assumption but that a simple dyadic relation is inconsistent with that view. The object of every act of cognitive apprehension is, I have urged, *always* complex; the act is an act in virtue of fulfilling the function of discriminating the parts and characteristics of that complexity. How, then, can it be other than a polyadic relation that subsists between the act and the object?

Professor Laird raises the question whether we are directly acquainted with cognitive acts, or whether we only infer their existence. I agree in the main with what he says on the subject; but, in view of Professor Broad's remarks, it is important, I think, to emphasise that direct acquaintance with cognitive acts is, in any case, essentially different from introspection of them. We may be conscious of (or, more accurately, conscious in and through) mental acts without making them objects of inner observation. The latter process no doubt implies the former as its indispensable condition; but it is no more identical with it than in the case of outer observation, the observing is identical with the object observed. That we do experience mental acts directly I take to be indisputable; it is not only in introspection that we become aware of something mental, we become aware of something

mental in and through being aware at all. But it seems to me a total mistake to say that in this primary awareness, the awareness is "identified with its object." No; primary awareness, in the sense of feeling or *Erlebnis*, has no object; its being consists simply in the awareness. When, however, we make, or attempt to make, this primary awareness an object of inspection, when, that is to say, we direct another mental act, an act of attention, upon it, then, of course, we are seeking to discriminate its features, and are bringing to bear upon it general ideas which may or may not be appropriate; so that in regard to it, as in regard to all other objects, there arises the contrast between the character which it has and the character which it appears to have. Now, I take this to be the explanation of what Professor Broad declares is the result of his own efforts at introspection. He has framed a hypothesis of the nature of mental acts; and, imbued with that hypothesis, it appears to him that he is not aware of any mental term in his cognitions. Yet he admits that "to most of us it does seem that a red patch and the seeing of a red patch are different"; and I presume he will also allow that ordinarily an individual would have little hesitation in reporting that the latter is a process taking place "within his head," while the former is an object outside his head. It becomes, then, a question whether in a matter of this sort, the unsophisticated observer is not the more reliable witness of the two.



*Meeting of the Aristotelian Society at 21, Gower Street, London,  
W.C. 1, on May 2nd, 1921, at 8 p.m.*

## VII.—ON PROFESSOR DRIESCH'S ATTEMPT TO COMBINE A PHILOSOPHY OF LIFE AND A PHILOSOPHY OF KNOWLEDGE.

*By H. D. OAKELEY.*

### I.

IN this paper an attempt will be made to consider the difficulty of attaining consistency in philosophy if we neglect neither of the two roots from which it proceeds, the experience of life and the experience of knowledge, as shown with unusual clearness in the works of Professor Hans Driesch.

The difficulty culminates in the theory of reality set forth in *Wirklichkeitslehre* (1917), but partial aspects of it are more fully brought out in other of his writings, especially *The Philosophy of the Organism* (1907—8), on the one hand, and *Wissen und Denken* (1919), on the other. A few introductory words may help to explain the point of view from which the problem will be considered.

Philosophy appears to have its sources in two fundamental impulses, the one proceeding from the experience of life, the other from the fact of knowledge, the dominance of one or other of these impulses determining the method followed in the most general respects. Not that they are ever found in complete separation. The whole experience of life in a rational being is a thing known or knowable; it may take on the form of an object of knowledge. The whole of knowledge for a practical being is something lived, it belongs to his doing, as well as to his thinking.

One or other attitude, however, is almost inevitably subordinated, and the tendency of thought will profoundly differ in accordance with the subordination selected. Some of the greatest conflicts in the history of philosophy could perhaps be

shown to be in the end due to this underlying inconsistency in the relation of man to the world. He belongs to two kinds of reality, not, as Kant thought, to a real and a phenomenal world, but to two orders of being, equally real.

Philosophy as knowledge always has the character of an attempt to reacquire or reconquer something that ought not to be alien. The mind as knowing endeavours to absorb all things into itself, to translate them into its own forms, to compel the solid world to "melt, thaw, and resolve itself" into something mental. Philosophy as practice postulates the reality of an independent world. There must be something over against the knower who is also doer, which is "on its own," from which proceeds what his mind can never completely control, changing or acting in ways new to him, relatively to him, creative. Everything counts for at least one in this practical world as existent. Its claim to existence must at least be heard. We cannot make its being entirely subordinate to mind. Thus there must be a real manifold.

But in the world of thought all things gain in reality as they give way to the sway of mind. Hence all existents there tend to a unity. Is there any identity of spirit or of principle in these two activities, in virtue of which both can bear the name of philosophy? In both spheres there is found a definite perception of something unreal in experience, a perception that we are set in a world of appearances and the real is still to seek.

In the history of philosophy, which is the history of mankind, we have a series of experiments in the search for the real. Practice makes trial after trial, from the nomadic life to the complexity of modern civilization, from the making of history by individuals to the work of confused mass-movements. Thought without expecting finality brings forth conception after conception. Thus humanity never rests. The animals have changed little in history, because they have not perceived the unreality of their existence.

But when we interpret the philosophy of practice we must use the formulæ or instruments of thought, and its meaning therefore cannot be fully rendered. Thought is indissolubly united to language, and language is a kind of symbolism which inevitably neglects the unique, the particular, and fosters the tendency of thought to conceive the universal as the real. There is much in practical life that seems analogous to the importance of the universal for thought, and by a natural fallacy, precious to all as moralists, the supremacy of the universal in the ideal of life is regarded as a supremacy of identical nature with that of the universal in knowledge. In fact, the analogy is misleading, because the meaning of the universal for life is lost unless the individual is equally real. It is not thus for thought, though logic, inherently necessitated to claim all worlds of experience as ruled by its own principles and methods, may, in the endeavour to bring under its control the whole realm of practice, sacrifice something in the purity of its universal. The independence of the individual is only realized through experience of the world of life, and whether we can conceive this realization as acquired by a mind not itself a member of that world appears doubtful. Experience *qua* knowledge would seem to give us only an object or series of objects capable of being systematized into a unity in which all differences lose their independence. It is because we have our being in the universe of objects, in which changes occur as events, that we know at least one department of that universe from the inner side, and it is through this inner knowledge that we are introduced to the fact of individuality as a property of many distinct existences. How far it extends is a question we investigate as knowers. As living beings we become aware that it is in some measure a property of the animal, perhaps of the organic world. Without this experience we might—as I would suggest—lack the sense by which individuality is discerned, and be, as it were, blind and deaf in regard to that feature of the universe. Certainly from the stand-point of

knowledge also, the nature of the living being and the changes observed in it are of a different kind from any other observed phenomena, yet what we are conscious of as individuality, and the essence of it, that it is incapable of complete characterization under the universal of knowledge, is only revealed to us as individuals ourselves, interacting with other individuals. Thus the relation of persons appears, if we start from the phenomena of practical life to be the original relation, but if we start from the experience of knowing, the relation of the knowing consciousness is primary—the “*Urbeziehung*” (Driesch). We might pass to a simpler order than that of life, and notice the contrast of our two kinds of experience the contrast between the condition of being external, or of being internal to change. If we ourselves were not changing movements should we be aware of the nature of change, whether in “enjoyment” or in “direct acquaintance”? All the phenomena of the world as becoming might truly present a special form of static order for knowledge, were not knowledge possessed by a being itself a part of change.

## II.

That becoming does not belong to the object, “*etwas*,” of original consciousness is essential to the position of both the *Wirklichkeitslehre* and the *Wissen und Denken*. It is in the latter work that the metaphysical import of knowledge, and knowledge alone, in the totality of experience is most definitely brought out. The significance of knowledge for reality is thus summed up: “The real is so constituted that it has knowledge of itself in a form which is presented phenomenally to the self-conscious I,—as many individual knowers (subjects) bound to that which appears as body in space.” Further, the elements of the original fact of consciousness, “I,” “have,” and “order” are taken over into the metaphysic of knowledge unchanged. “All that I have as object of knowledge is indeed phenomenon, but the fact that I know something is more. In this respect

alone does experience in the widest sense of the word present immediately a side or aspect of reality." Similarly in *Wirklichkeitslehre* the relation of knowing cannot signify in itself anything which is a different form of being, though there may be higher kinds of knowledge, whereas all other relations may be different in reality (the spatial, for instance, may mean some relation which is not spatial). The "etwas" of knowledge is then phenomenon. What is comprised in the "etwas"? Driesch's answer to this question is the result of his conception of knowledge as essentially "schauen," not "tun." This view is fundamental with him and emphasized in every possible aspect. There is no activity in judgment. Relations are contemplated by it. "I may assume that my soul is active, thinks, wills, compares, connects, synthetizes, judges, orders. But I merely *have* that which stands in order. As perceiving order, I also have all the above enumerated concepts of activity, as special psychological signs of order." The original I of experience is not Descartes's ego, for it is unrelated to time, and beyond the distinctions of unity and multiplicity. It is distinguished from the self which is always the same in constant time, but which is not yet enduring, and the soul which is constant, enduring, and becoming. The soul is not immediate, but like nature, a mediate object—"meant"—and "*as if* independent." Thus Kant's psycho-physical beings, possessed of sensibility and understanding, are in the sphere of the object, not the original subject, and there is no original activity of the understanding, making its world. The theory of will is consequent on the theory of knowledge. Here also there can be no original activity which is real, for only knowledge is real, and to know is to apprehend intuitively, though not in Bergson's sense of intuition. In the experience of willing there is no doing of the I,—no new form of relation between "I" and the object is presented, only a new special form of the object. Of the elements discoverable in an act of willing the chief are the strong affirmation of the I, and the knowledge



that the body is capable of a certain task. But the whole process, including the "*Ich-betönung*," belongs to the object.

This doctrine of will may be described, as Professor Driesch says, as Intellectualism or Rationalism. Willing and feeling, on this view, become by-forms of thinking, distinguishable by their obscurity from the possession of thought. Thus all ethical consciousness belongs to the sphere of the rational. The intuiting of order or disorder in the total empirical moral content is of the same kind as the intuiting of order or disorder in the content of causality.

The soul, indeed, thinks, acts, wills. "This means that in the sphere of the soul I see the concepts expressed in these words, producing order in a psycho-causal sense." All this is in keeping with the doctrine that allows the practical experience no standing in reality, no right, so to speak, to be carried over in its essential principle to the real.

That which is object to the knowing consciousness, from this point of view owes such reality as may be attributed to it to the fact that it can be object of knowledge; anything in the data of practice which cannot clearly appear in this relation is only confused thought. For it is not in this connexion that Driesch allows the conception which is developed in *Wirklichkeitslehre* of an "an-sich" which is beyond all that is "für-mich" though not wholly beyond, for on one side it is related to consciousness. It is just where he might approach the Kantian view of practice that he is farthest from Kant. The being in itself which he says must be postulated, though in no dogmatic sense, if the need for a metaphysic which proceeds from logic is to be satisfied, is an "in itself" which, arising out of knowledge, takes us beyond knowledge.

It might be asked, what is the result of the combination of the proposition that all object of knowledge including all that we experience as activity, whether in knowing or willing, is phenomenal, and only the fact that I have knowledge is more than phenomenal, with the proposition that knowledge is the original

of all relations? If it is this it might seem that it must be the foundation and source rather than the denial of other relations, at least they must be capable of interpretation by means of the relation of knowledge. And this would seem to be involved in the conception of the test of metaphysical truth which requires in addition to those of logical validity (consistency, economy) the principle that the real must be an adequate ground of experience, as well as more than experience. When, however, Driesch considers the nature of the original relation as "wissen," the problems of the relations of practice and life seem to be ignored. Philosophy, it is said (*Wirklichkeitslehre*)—if it is not to remain solipsism,—must give up the original significance of the I in the primary fact, I know something, and posit "wissen" as the original relation of reality, indissolubly bound up with the being of the real, or, it must assume real consciousness, unknown in its "an-sich," and only bearing the name consciousness, since its being conditions the being of the known I know. And again, to the question why the original relation of the real as knowledge should appear in the sphere of experience in the form of many conscious individuals who, so far as conscious knowledge is concerned, are completely separate from each other, no answer beyond vague conjecture can be given. This conjecture, when formulated in the "Higher Metaphysic," is wholly conceived from the standpoint of thought thinking itself.

### III.

The results of the treatise, *Wissen und Denken*, and the dominating line of thought in *Wirklichkeitslehre*, might seem to discount for metaphysics the main results of the earlier *Philosophy of the Organism*. If the truly real is pure consciousness as contemplation, involving no activity, no will, (for the "Urwollen" for order, which is ascribed to it, does not appear to be the source of any activity of experience), whilst the activity of self and other selves, all becoming, all doing, have a very

secondary being as the appearance of reality for consciousness, the form in which it knows itself, can we stop short of a philosophy in which all experience tends to be a passing illusion—Maya? Professor Driesch's view of the solipsistic beginning of philosophy would seem to necessitate the minimizing of all contributions of experience to our knowledge of reality, other than the contribution of knowledge. For we cannot be solipsistic even in method, or provisionally if we take account, philosophically, of the practical experience. In the point of view stated in the introduction to this paper, it is involved that we only become aware of self, and its object, together with awareness of other selves, in relations of feeling, action and knowledge.

Driesch when taking as the original fact only that experience which can become knowledge, and not that which has in it the potentiality of practice, appears to lose sight of the truth that for experience, knowledge itself is always a knowledge shared, potentially at least, by some other mind. This is what the universal, inherent in knowledge, means for experience, and any interpretation of this experience as pointing to a reality of consciousness which is not a many, can only occur at a stage later than the discovery that there are worlds of knowledge, partly distinct, and partly overlapping.

When we ask whether the philosophy of life can maintain its place as philosophy, beside the theory of reality as consciousness, it must be noted that according to the view expressed in *Wirklichkeitslehre* and resulting from the doctrine of knowledge, the special sciences must always be viewed by philosophy from the idealistic standpoint. "The sciences may work naïvely in their own house, but for philosophy, chemistry must always be my chemistry." It would seem then that if concepts belonging to biology—organic whole, individual unity—have in them characters which suggest their application more widely in the universe, such a procedure may become highly questionable when biology becomes "my biology," under the criticism of

philosophy. How are the concepts which belong to philosophy as philosophy of life, and which Driesch especially applies to history (itself understood by him as belonging to nature, and sharing its hypothetical reality)—the concepts of individual, and organic whole—arrived at? In *The History and Theory of Vitalism*, 1914, the notion of “unifying or individualizing causality” or “the transformation of a mere sum into a distribution that is in some sense a unity, without any spatial mechanical predetermination of this totality” is treated as a concept of logic, about which we can know *a priori* that it represents a possible form of becoming, a possible way in which becoming may be rationalized. This concept is then found empirically to be realized in the organism, biologically studied, or to be the prototype of vitalistic becoming. It seems strange, therefore, that this notion does not appear to have a place in Driesch’s classification of the categories in *Wissen und Denken* amongst those that are infallible (unverbrechbar). These are of two grades, firstly those original signs of order which the *I* finds in its object, and which are inseparable from any consciousness of an object,—valid for all possible existence—this, such, different, etc.; secondly, the Kantian categories, not original in the same way, but necessarily arising, as soon as nature has been postulated, if the world is not to be chaotic, thing-property, cause-effect. It would seem to be intended here that logical and scientific order in the most general sense do not involve such categories as individuality and organic whole. Knowledge might be satisfied without them. Everything may be thought as ordered or susceptible of order in the universe, once we assume that everything is knowable. All is at least conceivable as related to one mind, and nothing need disturb the postulate of science that error is only due to limitations of knowledge, not to irrational factors in existence. But if logic demands that the organic concepts be found applicable as categories to experience universally, there will be a considerable element of the a-logical in experience. Driesch’s Zufall, Aristotles τύχη have their

place in the spheres in which the mind expects to find purpose and the teleological whole. Thus in the *Philosophy of the Organism*, it is explained that although "with regard to necessity, philosophy must maintain that nothing happens in nature that is not univocally determined, and that therefore nothing is "contingent," philosophy may speak of the contingency of events—whenever it is not possible to discover anything like a wholeness or a plan—to which their local and temporal appearance is due." It is in this sense that "Zufall" is used throughout the *Wirklichkeitslehre*.

The organic categories or postulates would appear to belong to the class of empirical concepts, in the plan given in *Wissen und Denken*. For biology the teleological form of change must be used as at least an explanatory or interpretative category, provisionally adopted. Where this fails, when the ear of the horse does not warn it of danger, or the brain of the mentally defective control his behaviour, we have what Driesch calls "Nicht-ganzheit." Does this involve "Nicht-ganzheit" from the standpoint of the universe? Only if the organic category claims universality. In *Wirklichkeitslehre*, when the question is asked whether nature can be viewed in its quasi-independence as a single whole, from which all propositions on individual events gain their content, the idea of "Whole" is interpreted in accordance with the idea of a living individual. In this type special laws would disappear in the universal principle of the whole, and the One would become, in the sense of a real evolution (as that of the organism in life to maturity). This, it is said, is the fundamental thought of a logical Monism. It would signify that the ideal is involved in the original order-conferring knowing of consciousness, and the kind of order manifested in life would be essential to any system of order. Nevertheless, the organic whole in Driesch's conception is not that of Hegelianism, and the difference belongs to the core of his philosophy, and to its double root. Individuality is the soul of his philosophy of life and the ideal of wholeness in

the individual cannot be sacrificed completely to that of the wholeness of the All. We have, however, to go back to what indicates perhaps an earlier phase in the development of his thought, for a justification of the treatment of "Individuality" as a logical category. In the *Philosophy of the Organism*, he asks whether "there are no categorical means of understanding vitalism in the same way as mechanics and energetics were understood? Would our analytical discussions about vitalism and entelechy have been possible at all if there were no such categorical means?" The reply is that the experience of the factor of entelechy awakens a certain category which seeks for further application, and that "the ultimate results of the proofs of vitalism acquire their proper intelligible meaning only at the moment when the foundation of entelechy upon a special category of its own is appreciated." This new category he names "Individuality," or "Constructivity"; it must be "in order that we shall have any systematized experience about specific and typical constructions." ("Finality" or purposefulness is a sub-class of individuality.) The method of establishing Individuality as a category is in accordance with Driesch's view that there are certain "irreducible principles of relation, or ontological prototypes, the task of science being to coordinate natural 'givenness' with these prototypes." He claims that his conception of nature, enlarged so as to include a portion that is not wholly spatial with its prototype or category of individuality, allowing us to create elemental constituents with regard to spatial nature, but not *in* spatial nature, avoids the unsatisfactory result of Kant's nature philosophy for which "givenness" is broken up into three parts, nature, life, the moral world. Here then again we have the view that the whole of activity, in the forms of "vitalistic principle, acting, and morality," is included in nature as the object which for the doctrine of knowledge is phenomenon, "Entelechies and psychoids are *νοούμενα* as not imaginable only conceivable, but they are not *νοούμενα* in the transcendent

sense of Kant, for they are constituents of the world of *φαινόμενα* as far as the world they relate to is given to the Ego."

"Entelechy," it is added in a note, "is not identical with consciousness or the psychical. . . . Even if we were to proceed from our methodological critical idealism (solipsism) to metaphysic, entelechy and psyche would not be identical, though they might then be nothing but two forms under which one and the same reality is expressed." This latter hint, we might expect to find confirmed in the doctrine of reality, but it is not carried further, and the reason seems to become clear in the more final exposition of the doctrine of knowledge in *Wissen und Denken*. The philosophy of consciousness is in fact gaining on the philosophy of life as it inevitably must in a process of thought which begins with solipsism, and conceives knowledge as essentially "schauen." The principle found in reality by the philosophy of life cannot be accepted as real from the standpoint of knowledge.

#### IV.

The conception of individuality in spite of its crucial importance in Professor Driesch's work has not sufficient strength to maintain its place steadily in his final metaphysic, because it does not originate in its proper field, the relations of persons in the practical sphere. The philosophy of life beginning in a philosophy of the object will always be subordinate to the philosophy of knowledge. In the practical world of life, the member of a greater whole, if itself a whole, can never cease to be an end in itself, and become a mere means. It is in *Wirklichkeitslehre* that the problem of the application of the notion of the organic whole to the universe comes to the forefront, and the concept of individuality is of less interest. The main question is whether the ideal of thought can be satisfied in the sphere of the development

of life, and human history, by means of the only appropriate category, that of a "real evolution." Even in the sphere of inanimate nature the search for the presence of wholeness applies as test that which is furnished by human experience. Consideration is given, for instance, to Professor Henderson's speculations on the fitness of the environment for the purposes of life. As regards the totality of life, the general conclusion is that, in so far as the members, the living individuals, are related to each other, as in the striking facts of reproduction, and heredity, it may be conceived as a developing whole. The real nature of this whole is however unknowable; we have no data for a conception of the goal of phylogeny, and its nature must be conjectured to belong to the sphere of the spiritual. This conjecture implies of course some reference to the conception of super-individual entelechy. As an example of the weight still given to the notion of individuality, may be noticed the striking treatment of animal existence, the insistence on its importance for philosophy, too often ignored, the observation on our ignorance of the psychic nature of the animal and the conditions of knowledge in the animal world. As an obstacle to the recognition of a real evolution in the history of species, Professor Driesch notes the co-existence of the most primitive with the higher forms. Even where there are obvious stages of progress in phylogeny these do not take place in a single line. His recognition of the problem of the myriad species may be compared with Professor Alexander's admission of the difficulty presented to his system by the facts of the multiplicity of individuals. In the survey of human history he distinguishes those aspects of social life which indicate that the individual is a member of a whole, from those that suggest that this whole is in process of evolution. The moral consciousness, in the two main expressions of the sense of duty and sympathy, is all important for the former aspect. In this we see the strongest evidence of super-personal wholeness, and—as appears later—the only ground



for regarding the *principium individuationis* as residing in the immaterial. In the *Philosophy of the Organism* the observation occurs that for the conception of the community of men as a super-personal unity, morality would be merely apparent, would cease to be a "category" (as it is treated in that work), but in *Wirklichkeitslehre* the significance of the ethical factor as sign of the universal is the important point. The significance of the consciousness of membership of a whole, indeed, appears in a somewhat different light in the two works. In the final reference to the meaning of "duty" in *Wirklichkeitslehre*, it is on the ground of individual consciousness of duty that it is conjectured that individuals are essentially distinct in their function in the Whole. "What my duty is I intuit clearly, and also that my intuition of my duty is the expression of super-personal evolution." This statement seems to give recognition to the truth of practical experience that emphasis on whole and individual increase together. But the interpretation of "intuition" which would belong to this point of view is not given. It would require some kind of two-aspect theory of one and the same reality in entelechy and in psyche or consciousness, which, as noticed above, Driesch hints at, but does not pursue. The principle of harmony, seen in the occurrence of vocations in individuals, harmonious both with each other and with the racial need, is also indicative of the presence of the universal. As regards the question of a "real evolution," sociology, racial psychology, national histories, Hegel's *History of Culture*, reveal at most by-products of anything that can be so conceived. At most the history of the human race may be assumed to be the expression of an evolution entangled so to speak with contingency. The only line of real evolution, as distinct from a cumulative process resulting from the concomitance of distinct factors, is in the growth of knowledge, to which is also due such signs of practical progress as can be discerned in ethics, political conditions, etc.

When at the stage of Higher Metaphysics the import of history is speculatively reinterpreted in the light of the conception of knowledge as the original relation, knowledge must be conceived as the only real non-earthly experience, and individual existence is a contribution to the increase of the content of knowledge. The culmination of Driesch's endeavour to discover a whole in the process of humanity, the process of the world, is thus a conception for which the greater part of universal history would be devoid of reality and intelligibility. The total process of human existence may be but a single stage in the evolution of the super-personal whole, *qua* furnishing fragmentary elements of this evolution. "Knowledge alone is the light in the darkness."

## V.

And yet his labours in the philosophy of life have gone far towards furnishing a point of view from which a less pessimistic conclusion is conceivable. It is, as may be suggested, just because history (in a wide sense) is not given its place as having at least equal rights with any of the systematic sciences as a basis for philosophy that the significance of individuality in practical relations, and the contribution of the practical experience to knowledge of the real are not fully rendered, even in Driesch's original treatment of the individual as whole. The sciences are the field for the application of the categories of pure thought, knowledge as thought. History, as understood by practice, experience as lived, alone give us direct insight into that part of reality without which even in the sphere of the sciences, "the spring of the year" will be taken out of knowledge. It may be that the interpretation and application of Individuality as a "category" obscures the significance of the fact. For as soon as it is conceived as a category of thought, its significance is diminished. The category of thought must be a universal, and individuality categorized becomes the law to seek for the individual, rather than the instrument for finding

it. But as the history of epistemology has shown, from Aristotle to Bradley, there is no law of thought for the discovery of the individual. It may be better in the difficulty of characterizing that which is always something more than thought, to describe it as an elemental fact, or source of facts, which we discover by the organ of practice, as colour by the exercise of vision, rather than as a category. The field of practice is the relations of individuals, and thus the content of knowledge is enlarged by inter-individual experience. From this point of view a unification of the philosophy of knowledge with that of life is not inconceivable. The result would perhaps approach the conception of the two aspects of reality shown in *entelechy* and *consciousness*. The postulate, however, which is necessary to the attribution of reality to the experience of life, *viz.*, that consciousness as knowledge is a knowledge shared or shareable, is destroyed by the solipsistic method and this method again is possible, because the study of life is approached as the study of a special science belonging to the *eternas*.

If in the progress of Professor Driesch's doctrine of reality the philosophy of knowledge tends to occupy the whole field, the consummation is prevented by the position given to the fact of evil (*Böse*). His interpretation of error and evil, on identical principles as due to materiality cannot be completely carried out. The two explanations are not really on parallel lines. The obscuration of knowledge by the conditions of the nervous system and the sense-organs results in that imperfect ordering of the object, that use of inadequate categories, which is "*Nichtganzheit*." In so far as Driesch ascribes all progress to knowledge, evil would be for him not merely analogous to error, but identical with it, and his view in this respect would be near to that of idealistic interpretations for which both belong to finitude. But this is not consistent with his differentiation of evil as not merely "*Nichtganzheit*," but ("*Gegen-ganzheit*." In the case of knowledge it is enough that the members of a whole can be related to each other in a system, in

the case of practice it is essential that the relation should be of a certain kind suitable to each individual as end in himself as well as member of the whole.

Finally, it may be observed that this persistence of the method of thought resulting from a philosophy of life, in the face of the overwhelming authority for philosophy of philosophy as knowledge, may be due to the ultimate derivation of the idea of metaphysic presented by Professor Driesch—viz., search for the real beyond experience (whether this search seek its satisfaction through logical method only or give weight also to ideas belonging to practice)—from the experience of life. For the claim of logic to find a reality within experience through transformation of experience by thought has more show of justification, more promise of success, than the claim of ethics to give reality to life. A higher logic may bring error under its system and so destroy it, but no higher ethic can assimilate evil, and Driesch himself regards as unworthy of consideration the view that evil may be treated as the necessary complement of good. It appears to be from the standpoint of practice, then, almost in spite of his leading thought, that he is driven to his position of opposition to all the “inner-weltlichen” tendencies which he finds in contemporary philosophy (*Wirklichkeitslehre*, Vorwort). The elements of experience which are hostile to the principle of wholeness are discerned by the practical being. Important also in this connexion is the great significance attached to the fact of “suffering,” on account of “non-wholeness, especially the non-wholeness of knowledge.” It is this, together with the transitoriness of knowledge for the individual in connexion with the doctrine that certainty of knowledge can only be attributed to the solipsistic fact, which opens the door to the “Higher Metaphysic.” Into this most speculative part of *Wirklichkeitslehre* it is not necessary to follow Professor Driesch for the purpose of this paper. His view, however, that where a dogmatic metaphysic seems impossible a speculative metaphysic is legitimate, appears justified by his argument

that logic, and it may be added the whole of experience, point to the need of a theory of the real.

## VI.

To sum up, it has not been intended in this paper to criticize Professor Driesch's philosophy, but to consider it in so far as from its very thoroughness, originality, and even consistency, it illustrates a problem of method which appears to be of fundamental importance. A critical standpoint is involved to some extent in the judgment that the fullest use cannot be made of his "category" of individuality, because its origin in the relations of individuals in practice and in the experience of knowledge does not seem to be recognized, though the factor of introspection is fully admitted. The solipsistic view of the beginnings of knowledge, and the view which relegates all activity to the sphere of the object react upon each other. It is not realized that it is because knowledge is not only knowledge of knowledge, but also knowledge of practice (in an intuitive sense), that we never are at the solipsistic stage. Not only does practice involve a many, but knowing also is for our experience something that involves other knowers, something shareable.

This is not to imply any doctrine of metaphysical monadism, but to point to the nature of reality for experience as it is there for the interpretation of philosophy, the necessity of inter-individuality as instrument of the knowledge we have, not inferior to the fact of knowledge in the order of reality. Professor Driesch's view does not make the practical experience intelligible, because he does not admit the contribution of practice to knowledge. But even the slight meaning allowed to history, as a scene for the growth of knowledge, its one contribution to real evolution, does not seem secure on his premises. For there is no place for "becoming" in original "Wissen," the conception of knowledge is static. Yet why is so important a place conceded to history in *Wirklichkeitslehre*?

Consciousness as reality, defined as knowledge, requires, it may be said, as its object, a whole within which diversities are related in a unity, but not, *qua* knowledge, a developing whole. If this fact of development is to be taken as belonging to reality, and not merely to the appearances through which it manifests itself, this must be because the completion of knowledge postulates a world of practical beings, and practice is more than confused thought. But practice and evolution can only take place on condition that there is the irrational to be rationalized, and thus the elements that obstruct order, error, evil,—Zufall, have their interpretation. Driesch recognizes that the dualism of experience must be referred to reality.

From the standpoint of this paper, experience in human activities generally, including those which are not concerned in the evolution of knowledge, in the strict sense, contributes, in virtue of the fact that existence is set in the inner side of change, to the discovery of "categories" or features of the universe necessary to its interpretation for knowledge, both within and beyond the human field. Of these features that which we call Individuality is at least discernible. On any other view we have the result that practice, *qua* practice, makes no contribution to knowledge, and that it is impossible to reach the truth of practice from the starting point of knowledge.





*Meeting of the Aristotelian Society at 21, Gower Street, W.C. 1, on  
June 6th, 1921, at 8 p.m.*

## VIII.—ON THE STRUCTURE OF SCIENTIFIC INQUIRY.

*By* DOROTHY WRINCH.

THE problems of scientific methodology have always claimed the serious attention of our Society, so that though I have no observations of a metaphysical nature to present to-night, I offer no apology.

The object of this paper is the study, in some of its aspects, of the structure of scientific inquiry. The subject is a large one and covers the major part of the field of scientific methodology. We shall confine our attention more particularly to the consideration of those problems of scientific structure which occur in the case of more advanced sciences and merely outline the corresponding problems which occur primarily in sciences in the more elementary stage.

The data of science as presented in experiment and observation have many interesting characteristics. These have been discussed by many writers. Whatever else may be true of these results of experiment and observation, it is quite evident that they are discrete and particular. We get some characteristic predicated of some term, some other of another term. We assert that this particular object which is under consideration has a certain property. But no light whatever can be thrown on scientific problems by statements of this kind alone. The fact that the deflection of light from a great distance, caused by passage through the sun's gravitational field is  $1.74''$ , is not in itself a fact significant for science. It is only when we begin to deal with general propositions regarding the behaviour of objects that we are entering the field of science. The proposition that bodies fall to the ground can be a starting point for science equally with a proposition as to the dates at



which birds begin to sing in the spring or a proposition as to the behaviour of any particular substance in water. An observation of one body falling to the ground or of one bird singing, or of one case of a substance diffusing in water, are not in themselves of scientific significance. In science we seek to order the phenomena of the world into classes and subsequently to order these classes among themselves. The elementary stage of science deals with the problem of collecting phenomena together and ordering them in classes as, for example, in the general proposition as to the dates at which birds begin to sing in the spring. The central topic to be discussed in a study of the structure of science at this stage is the nature of the relations between the particular propositions which our experience yields and the general propositions with which science opens.

There is a bewildering variety of these relations, and in our inquiry to-night we cannot go into a detailed investigation. In essence, however, all these relations come down to the relation between a set of propositions, " $a, b \dots$  have the properties  $\phi$  and  $\psi$ ," and the proposition "Everything which has the property  $\phi$  also has the property  $\psi$ ," and the somewhat similar relation between a set of propositions, "the properties  $\phi_1 \cdot \phi_2 \dots$  belong to  $a$  and  $b$ ," and the proposition "All properties of  $a$  are also properties of  $b$ ." In observation and experiment we become convinced of the truth of certain particular facts, facts which relate to the particular objects on which we are working. We investigate the properties of this and that specimen. But we can only arrive at propositions of the form:  $\alpha_1$  and  $\alpha_2$  and  $\alpha_3$  and  $\alpha_4$  have the property of  $\phi$  and  $\psi$ :  $a$  and  $b$  have the properties  $\phi_1, \phi_2$ , and  $\phi_3 \dots$ . We want of course to pass to general results in the first case about  $\phi$  and  $\psi$ , irrespective of the particular objects  $\alpha_1$  and  $\alpha_2$  and  $\alpha_3$  and  $\alpha_4$  which figured in our experiments, and in the second about the relation between  $a$  and  $b$  irrespective of just those properties we have particularly studied. A discussion of the transitions from the several

particular propositions to the generalization in these two typical cases must therefore be undertaken.

It is at once apparent that in neither case can the deduction of the general propositions from the particular ones be guaranteed by logic. There is no necessity about a set of things with many properties in common having all properties in common. If there were, how many properties would be a sufficient basis for the deduction of complete similarity of properties? And what counts as one property? And is the fact of several things having a set of similar properties relevant? A string of questions at once appears. But it is plain on grounds of logical cogency alone that the position would be untenable. Something further must be introduced before we can pass from the class of particular propositions to the general one. The new element needed is a principle or set of principles of probability.\* It is only possible to pass to an assertion of the probability of the general proposition from the particular propositions and not to the assertion of the certainty of the proposition. The nature of the transition in the two cases is closely parallel.

The position about this problem of probability inference is clear to some extent in its formal features and a series of postulates has been elaborated. As in the case of geometry, several sets of postulates can, doubtless, be constructed which all satisfy certain obvious requirements and which differ in ways which only become relevant at special stages. The elaboration and comparison of various sets will be an interesting branch of logic: for though the concept is not a logical concept like the notion of addition or multiplication, yet the working out of postulates as to its properties, given that certain specified properties must result, is a matter for logic.

Grave difficulties, however, still exist with respect to other

\* This matter has been discussed in detail in a paper by H. Jeffreys and the present writer in the *Philosophical Magazine*, December, 1919.

aspects of the transitions. The first case is especially unsatisfactory. A few isolated results as to the expansion of water at various temperatures are obtained. They are plotted on a graph and a curve is drawn through them. It cannot be denied that many curves will go through a finite number of points: and the smaller the number of points, the more bewildering the situation appears. For we might ask, looking at the matter geometrically and without the sophistication brought about by the study of mathematics, why is one curve better than another in any sense which is of scientific significance? In the hard discipline of the study of mathematics we tend to consider one curve simpler than another and we should for example attempt to get all the points plotted on to a parabola rather than a cubic, or on to a cubic rather than a quartic, or perhaps on a sine curve rather than an elliptic function curve. But no one has so far offered any satisfactory solution of this problem. When we put a curve through a set of points we may look upon the points as a selection of the points on the curve. And according as we choose different curves we shall regard the points as selections from different curves. The problem of choosing and classifying curves which contain the given points, is then the general problem of classifying a class of terms by reference to all the classes of which they are a sub-class. The general theory of classification as applied to all the classes from which a given class is a selection may perhaps have suggestions to offer as to the possible treatment of the problem. But the theory will necessarily be difficult, being indeed of the same generality as the theory of geometries. Moreover one feels that a theory with the status of a geometry will not finish the problem without the inclusion of some non-logical idea by means of which the various classes can be distinguished. And this conclusion in essence leaves the problem where it was. But our aim to-night is the discussion of the structure of science which has passed beyond the stage of initial empirical generalization. Beyond insisting on the relevance of probability

theory and on the existence of grave difficulties we cannot, on the present occasion, deal with the problems which occur in the more elementary stages.

In our investigation of some characteristics of the structure of science it is important at the outset to examine the status of the physical notions which are used. A physical notion, refined so as to be significant in science, is a short-hand way of referring to a class of properties. The aim of science is to establish the truth of general propositions which cover, as particular cases, all the phenomena of which we are aware, and to arrange these propositions in such a way that the phenomena of the world are deducible from the smallest possible number of assumptions.

As an example we may take the case of the notion of an element such as hydrogen. "Hydrogen" is a term connoting a set of properties. A scientifically significant statement would be in the form that hydrogen always . . . under . . . circumstances. The structure of this result is as follows:—We assert that a set of properties:  $\phi_1, \phi_2 \dots \phi_n$  (these constitute the marks by which hydrogen is known) goes with other properties,  $\phi_{n+1} \dots \phi_x$ . Strictly speaking, we may assert first that it is the case that something does exist which possesses the properties,  $\phi_1, \phi_2 \dots \phi_n$ , then that something which has these properties has also the properties,  $\phi_{n+1} \dots \phi_x$ . But by the processes of induction, which have already been discussed, this result may by repeated experiments, be put in the more general form of assigning a probability to the proposition that the properties  $\phi_1 \dots \phi_n$  carry with them the properties  $\phi_{n+1} \dots \phi_x$ . The fact of the existence of physical and chemical constants can be expressed in propositions of this form. To say that alcohol boils at  $78^\circ$  C. is to assert that certain properties go together; to assert, in fact, that the properties of alcohol carry with them the property of boiling at  $78^\circ$ . The existence of atomic weights, of a quantum of action, of a universal charge of an electron, all give formally

similar propositions. A complete investigation of the chemical and physical properties of things will aim at establishing as many propositions of this form as possible. It is evident that in every case, as an intermediate stage we shall have the particular propositions which describe single experiments or groups of experiments. The general propositions will be obtained from these, but, as we have already explained, only with the aid of probability principles.

Now, if we examine the general propositions which are asserted in various branches of science, an extremely great variation of form will be apparent.

Consider the case of a science in which very large numbers of general propositions have probability values established. This fact in itself is not enough to guarantee any considerable degree of development in the science. Taking each of these general propositions as a unit, we are indeed next faced with the problem of building some structure of knowledge out of almost innumerable units. A structure which has inadequate foundations is unsatisfactory, but an arrangement in which all the units are so arranged that they are entirely independent, and no one depends upon any other, is not a structure at all.

The science which consists for the main part of theories which have no clear relation to common sense, which is the final touchstone of theories about the external world, is like a building without secure foundations. The science, on the other hand, which is mainly composed of discrete sets of minor generalizations, whose inter-relations are not known, is like a building in which the bricks are present but no attempt has been made to make a structure out of them by means of making a selection of the bricks support the weight of the others. In either case, it is not the number of bricks which is important, for a large number of bricks piled up on an insecure foundation is not of more value as a structure than a small number. Nor do a larger number of bricks, arranged so that no one supports any other, make a better structure

than a smaller number. It is indeed the relation between the units which is of vital importance.

The units must be arranged so that the relation between them is clear and so that they fit into some general scheme. In the first place, we must avoid logical redundancy. If one result can clearly be seen to imply another, it is manifestly unnecessary to employ each as an independent item in the foundation of the structure. And we should at once be clear as to the sense in which one proposition can imply another. We are using the word in such a way that a logical relation necessarily exists between the two propositions in question if it is true that one implies the other. It is unnecessary and unprofitable to discuss at this point wherein logic consists. No clear thinker has any difficulty whatever in appreciating when a relation is logical and when it is not logical. We all know the impossibility of getting more than eight half-crowns out of a pound, and we have heard, since the cradle, the song :

Ten little nigger boys  
Going out to dine  
One choked his little self  
And then there were nine.

From an early age we have been entirely convinced of the inevitableness of the last line in view of the line before.

We cannot fail to appreciate the inevitableness of the results of arithmetic. However large a part of it can be reduced to convention, there is still a residuum which is guaranteed by pure logic alone. One may dislike addition and multiplication, and hate subtraction and division, but the propositions behind these various facts are the propositions of logic. There is a finality about them. But many have tried to define the nature of logic, and no one, so far as I know, with success. It is a case where a definition is not important just as in elaborating a theory of scientific epistemology a definition of common sense is out of place. In each case we know what is meant by the term in question, and in ordinary

life it is not easy to go wrong with respect to the application of the term. In the second case, it is of no vital importance to press for a definition, for a definition could only be given in terms of some other concept which itself would again need definition, and which might not be so well understood. It is perhaps a different matter with a definition of logic, but in view of the fact that it is difficult to get a satisfactory definition, and that it is easy to point out, by examples, what is meant by the term, we shall not attempt to discuss the problem any further on this occasion.

We will then continue our discussion, using the terms "logical necessity" and "implication," confident that no serious difficulty can arise as to their meaning, and we will turn our attention away from the difficult question of definition.

Now, we want to avoid logical redundancy in the general propositions which constitute a science. We aim at reducing the number of propositions as much as possible. We want, indeed, to discover which, if any, of the propositions follow logically from any of the others and to retain those which seem more fundamental and reject (as independent results) those which follow from them. In this way we shall build up a structure in the way which is logically the most economical.

But, we must consider the form of the relations between propositions in virtue of which we retain one as a fundamental result and reject the other as an independent result and look upon it merely as a deduction from the first, so that the acceptance of the first involves the acceptance of the second.

It is a very striking fact that there is enormous variety in the relations which occur. The relations in some cases are very simple, and it is immediately plain that the one proposition implies the other, so that it is not necessary to retain both as fundamental propositions. Some sciences are notoriously easier than others, and in following the arrangement of the results obtained through induction and analogy by observation and experiment, the student is in some sciences able to make

notable progress with little thought, and in others is quite unable at first to make any headway at all. Yet in all cases whatsoever, it is logic that is behind the transition from one proposition to another. The propositions are either logically equivalent or one is logically a part of the other. And these assertions should be contrasted with our previous assertions in the case of the transition from the results of experiment and observation. When we pass from the propositions which embody our experiments and observations (and these are necessarily particular propositions, dealing only with one case of some phenomenon) to general propositions, we are relying on probability principles entirely, and pure logic alone cannot under any circumstances take the responsibility of the transition. The resulting propositions are only asserted to be probable. In the transitions we are discussing now logic takes the whole responsibility. Logic and any transition which we are justified in making stand or fall together.

Now, the very striking dissimilarity of the relations between the propositions is significant and of fundamental importance. It is of no use whatever to make a theory of scientific epistemology if the plain facts of scientific practice are not taken into account. Any theory, therefore, which offers any catalogue of logical relations so inadequate and incomplete as those of the older logicians is at once to be rejected. It is entirely evident that logic apart from its own internal development is most important in the part it plays in the ordering of our knowledge of the phenomena of the world. It therefore must be admitted that any description of logical relations which does not cover those which actually are used in scientific work is unsatisfactory. We therefore want a wider view and a freer imagination.

It is our object to study certain characteristics of the relations between propositions, but it is worth while to widen our field before pursuing our investigation any further. The part played by logic is extremely varied, and is not restricted



to the construction of a set of propositions in which no one is logically redundant. In the arrangement and collating of the results of observation and experiment, logic often suggests a more comprehensive statement which covers a whole class of results, but which goes beyond these results, and is not therefore the equivalent of the less compact propositions. Very many different cases occur in which logic brings forward suggestions which are provisionally adopted instead of the more restricted and less compact results to which experiment and observation led us to assign definite probability values. In studying the relation of such suggestions to our generalized experimental results, we are again dealing with transitions between propositions when the transition is not guaranteed by logic. Only by means of the principle of probability can the question of the correct epistemological attitudes to such generalizations be resolved. The central hypotheses of science in general cover the facts revealed by observation and experiment, but are plainly not logically implied by them. To establish the fact that a certain hypothesis accounts for certain physical phenomena is a matter of logic alone. But logic alone cannot guarantee the hypothesis given the physical facts. The only reason from the point of view of science, as opposed to that of pure logic, for preferring one hypothesis to another is the greater power of one than the other to lead to physical facts, especially if these facts had not been prominent in the construction of the hypothesis. It is therefore of fundamental importance in the construction of a methodology of science to study the relations between the more comprehensive and abstract hypotheses and particular propositions, in virtue of which it is possible to assert the necessity of the occurrence of specified physical phenomena, if a certain hypothesis is correct. And here again it is the dissimilarity in the various relations which subsist which is their most striking feature. The modern development of mathematical physics offers examples of theories going far

beyond the facts and yet being found subsequently to suggest the relations between facts not previously known to be related. But modern physics is a very interesting case from our point of view, because, since the appearance of the quantum theory, it has been in the main founded on two general types of principles, or two types of relations, which appear at present wholly irreconcilable. One class of phenomena is in accord with a continuous analysis, and another class with a discontinuous one, in which energy interchanges between matter and æther occur in jumps of prescribed amount. The phenomena in accord with one scheme appear wholly to contradict the other, and *vice versa*, and it is fairly true to say, nevertheless, that the whole known range of physical phenomena comes under one or the other. In fact, the data of physics are at present arranged in two quite watertight compartments, and no means has ever been suggested of establishing a communication between them. The form of relation valid in one compartment is wholly different from that in the other. And yet each generalization continues to inspire further progress, to predict new phenomena which can be verified by observation, and the duality merely means to the physicist that certain classes of phenomena, such as those relating to the emission of radiation from atoms, or the ejection of an electron from an atom, or the characteristic X-radiation, have a predominant probability of inclusion under the quantum form of relation rather than what we may call the continuous form. The fact that our epistemological attitude to theories which go beyond the facts which suggested them must be in terms of probability is clearly illustrated in such a case as this where two theories to some extent contradictory yet have an amazing power of correlating and predicting facts.

Or, consider the relation in the case of the Einstein theory of relativity. It is clear to any student that in this case the relation between the theory and the various experimental results on which it is based is of overwhelming difficulty to

almost all thinkers and it is plain that it is of a very different nature from that of the relations involved in the Darwinian theory or the theories of Freud and Jung. Whatever the difficulty and complication of the facts relevant to these theories the form of the logical inferences involved is manifestly of little difficulty when compared with that involved in the theory of relativity. These examples tend to make it even more evident that the variety of the relations employed is quite in advance of any scheme outlined by the traditional writers. And it will not be necessary to emphasize any further that it is logic and logic alone which is relevant at this point, if we are building up the structure of science.

An overwhelming theory may be suggested by a simple generalization made from experiment and observation, and yet go far beyond it. Then the important thing is to develop its logical aspect both as regards its implications and as regards the various possible theories from which it is deducible. This is to be done with a view to relating some at least of the deductions to the generalizations built up in the laboratory. Except from the point of view of the pure logician, and this is not the scientific point of view, it is indeed only with a view to arranging the phenomena of the world so that they shall be deducible from the fewest possible assumptions that the comprehensive idea is significant in science.

If this be allowed, it is plain that in the process of working out the system suggested by a comprehensive hypothesis logic and logic alone is relevant, in the fundamental sense. It is the consequences which must follow if the Einstein hypothesis is true that interest the scientific worker. The student with abstract ideas may delight in the hypothesis as it stands and may marvel at it and study it for itself alone, but it is the deductions which can be made from it that are important to the physicist. Now the construction of these consequences and the study of all the deductions which can be made from it are in the realm of pure logic. But, as we have sadly realized since

the Einstein theory came into prominence, this is by no means an easy matter. Examples from other sciences afford good parallels. The domain of logic in science is overwhelmingly wide and correspondingly difficult. No student who has any knowledge of the development of science can deny this. And yet the paramount importance of logic is very seldom realized and the study of it quite often avoided and only infrequently undertaken by those who seek to make contributions to our knowledge of the world. Professor D'Arcy Thompson in the wonderful epilogue to *Growth and Form*, Cambridge University Press, 1917, hints at the æsthetic glories of such a treatment of the world, in words which are full of hope and encouragement, and should earn for him the gratitude of all logicians.

The references to the quantum theory and the theory of Einstein will at once suggest to some people that what I am really talking about is mathematics. They will say that the importance of mathematics is realized by every actuary, by every business man and by every physicist and even perhaps by every physical chemist (even if not by every biologist); but that mathematics has its own field and that not every field of knowledge can be treated by mathematical methods. But I am not talking of mathematics alone and the methods I have been referring to are such that no field of knowledge can possibly be treated by any other methods. The methods used in building up psycho-analysis into a science are not identical with those of mathematics as employed in probability theory or the Einstein theory or Bohr's atomic theory and the general theory of spectroscopy. Yet in building up a science we try to arrange theories in such a way that their inevitable consequences are co-ordinated with the phenomena of the world. It is only these deductions which we cannot question that constitute the structure of the science. If a theory absolutely entails a certain set of consequences and if logical necessity dictates the deductions to be made, then the verification of some of the

deductions warrants the provisional inclusion of the theory. The position is then that the theory is sufficient to explain the occurrence of certain sets of phenomena. If the theory is true the phenomena must inevitably occur. Until the generalizations from observation and experiment are knitted together into a more or less comprehensive scheme, in which a few assumptions are sufficient to cover all the relevant facts which are known no real science can exist. The science of physics is the obvious example to cite. A single assumption—for example, the quantum hypothesis which says that in an atom only those orbits are taken by the electron in which the action for each degree of freedom is an integral multiple of a universal constant—involves far-reaching consequences such as, for example, the fine structure of the spectrum lines of hydrogen, whether free, or under the influence of electric or magnetic field. It brings together in one logical system very diverse physical phenomena so that if the assumption is true all the rest follows inevitably and needs no explanation whatever. Indeed these phenomena present no further difficulty to the scientific thinker who, studying the facts of nature, seeks to see how little he has to leave unexplained in the world.

But we must press further with our investigation of the structure of science. We will assume that it is logical necessity which alone can knit together the theories and the experimental results and go on to study some of the characteristics of these logical systems.

We have already remarked on the wide variety of the logical deductions made use of in the ordering of our ideas about the world. The complicated nature of the processes is also evident. Now the part to be played by logic in this matter is to collect all the possible and relevant deductions. Readers of the illuminating work of Whitehead and Russell in the domain of pure logic will not tend to underestimate the number of steps necessary to accomplish even the simpler deductions habitually made. The collecting, then, of deductions

with all the intermediate steps which are logically necessary is not the aim of workers in logic, but the continual accumulation of deductions in which the complication of the relation between the premiss and the conclusion is ever increasing and in which the intermediate steps are ever being suppressed. Logic will then indeed be the repository of the possibilities before us in our attempt to understand the world. The nature of these deductions will vary with the degree of complication of the relations between premiss and consequent. As we progressively drop more and more of the intermediate steps new ideas will present themselves, and it will be possible to go from one proposition to others of ever increasing complexity. Examples of simple deductions occur in systematic botany when the elementary theory of classification by means of mutually exclusive and exhaustive classes is used. In this only simple logical propositions, such as the law of contradiction and the syllogism in Barbara, are in question. But take Bohr's atomic theory and very complicated deductions are made which, owing to their complicated nature, can only be made with the help of elaborate mathematical technique. The deductions employed in the Einstein theory are similar in the degree of complication involved. And here I would like to emphasize once more the point I tried to make clear about the nature of the reasoning employed equally in biology and relativity theory, in psychology and spectroscopy, in anthropology and stellar dynamics, in the modern theories of solutions and in the theory of electricity and magnetism. It is the degree of complication in certain logical deductions which makes it convenient to shut some of them off from the rest of logic and call them mathematics. There is no fundamental difference whatsoever. To hold therefore that mathematical methods are inapplicable to biology or anthropology or sociology is merely to hold that all the deductions that will ever be made about these classes of phenomena will be of a sufficiently simple kind for it to be possible for investigators to make them without using any of the more

elaborate part of logic. A very slight acquaintance with the phenomena of leaves, looked at from the point of view of pure logic, makes such an assumption in the case of botany appear flagrantly unpalatable. It is difficult to see by what kind of scientific wisdom any worker in science could ever come to hold such an opinion about any set of phenomena whatsoever. Furthermore, it is not a fundamental distinction in any way that differentiates mathematics from the rest of logic; it is only the degree of complication.

But it will be worth while to consider in what the technique of logic consists. For it is the enormous amount of technique which exists in mathematics and the comparatively small amount in other kinds of logic which makes the majority of people divide them sharply from each other.

We will take a simple case where the nature of the technique is not difficult to grasp. A large range of problems in mathematics is grouped together under the theory of combinations and permutations. This subject has been considerably extended of late and now covers as well general problems of the theory of distributions.\* The anxious hostess planning the arrangement of her guests at a round table is quite well aware of the fact that there are several possibilities before her. But having decided where she wishes to sit herself and who she wishes to have next to her, she can quickly arrange the remaining places if the various guests are not fundamentally differentiated in her mind in respect of any characteristic relevant to the success of her dinner-party. But if there are certain proportions of the sexes, and if her four daughters are to be present, it will become essential for her peace of mind so to arrange her guests that the frocks of her daughters have the right background. But there may be various other factors to consider. It may be fatal to the enjoyment of her guests for

---

\* For an outline of the modern developments, *vide* MacMahon, *An Introduction to Combinatory Analysis*, Cambridge University Press, 1920.

a biologist and a physicist to be next to each other. Chaos in the conversation may result if an animal psychologist of an argumentative turn of mind sits next to a member of the Society for the Prevention of Cruelty to Animals: all general conversation may have to be dropped if the two spectroscopists are at opposite ends of the table. If the daughters have strong and divergent views on scientific topics, difficulties will still further be increased. Finally, imagine the situation if the number of guests is very large and if there are many different tables. Difficulties will multiply. The hostess with an abstract mind will sit down before the plan of the tables and wonder first of all which will be the best place for A and B and C. After many different arrangements of different selections from the guests, she will begin to wonder, not which is the best distribution of biologists and physicists, and of men and women, and of daughters and other people's daughters, but whether any possible arrangement exists. Now, this is, roughly speaking, the problem before us in the domain of mathematics I was describing. We want to discover whether any arrangement exists by which the distribution of various objects into various classes may be effected and certain specified conditions satisfied; and, secondly, to discover all such arrangements. The hostess who at once satisfactorily arranges her guests sees in a flash the answer, or the partial answer, to a problem which is exactly of this nature. She may meditate on the party afterwards and realize that A would have done just as well in K's place. But the formal problem before her of all the arrangements (if any) which would place her guests satisfactorily relative to certain conditions was a problem in combinatory analysis. Now in statistical laws, such as those which occur in the kinetic theory of gases, many problems of this formal structure occur. In the theory of the intensity of spectrum lines on the quantum theory, where any line can come from a variety of atomic jumps, with an intensity dependent on all their probabilities of occurrence, they occur also. Now it is plain that it would be better for our



hostess to study the general theory of all possible arrangements if she were going to give very large numbers of dinner-parties to very large numbers of guests, when certain conditions as to the arrangement are uniformly present. *Statistical laws* are the laws governing cases where there are a very large number of objects involved and the conditions which partly regulate their distribution are uniform within certain limits. In the consideration of such cases it is not possible to think out the theory of their distribution from first principles. It is too difficult. It can only be done by gradually working out the properties of the functions which represent the results in certain simple cases. The elementary theory of the number of combinations ( ${}^nC_r$ ) and permutations ( ${}^nP_r$ ) of  $n$  things taken  $r$  at a time is the starting point. It is possible to deal with the functions  ${}^nC_r$  and  ${}^nP_r$  whose significance in the simple cases is plain, and to discover the general laws of their behaviour, just as we can discover the general fact that every multiple of 5 ends in a 5 or a 0. In this case the general laws gradually became plain, and being well established by workers in the subject, they can be used by other workers to deduce results as to the possible distributions of sets of objects under certain conditions. MacMahon's most general problem in his *Introduction* is that of the number of different distributions of sets of objects  $a_1 a_2 \dots a_p, b_1 b_2 \dots b_q, \dots n_1 n_2 \dots n_t$  into sets of boxes  $A_1 A_2 \dots A_r, B_1 B_2 \dots B_q, \dots N_1 N_2 \dots N_s$ , when all the  $a b \dots n$  objects are similar and the  $A B \dots N$  boxes are also similar.

This is the general problem of which a particular case is present in the arranging of the guests at a dinner at various tables, when  $a_1 a_2 \dots a_p$  are representatives of one school  $\alpha$ ,  $b_1 b_2 \dots b_q$  representatives of another school  $\beta$ , and  $\dots n_1 n_2 \dots n_t$  are representatives of another school  $\nu$ , and the etiquette of the situation requires them to be so placed that (*e.g.*) at any one table the proportions of the members belonging to each school shall not differ by more than some small

amount from the proportions in which the various schools are represented.

In the consideration of the corresponding general problem, technique, in the form of sets of logical deductions whose intermediate steps have been suppressed, must be employed. But the logical necessity of the answer being what it is and nothing else whatever, is the same as in the simple case of arranging  $a$ ,  $b$ ,  $c$  and  $d$  at a table so that  $a$  and  $b$ , and  $c$  and  $d$  shall be separated.

Logic then is the repository of deductions within which the intermediate stages have been suppressed. There used to be a poster in the early days of butter shortage depicting nuts and cans of milk and also a slab of margarine. The nuts and milk are the materials, the margarine the finished article: the intermediate stages are suppressed. Similarly logic collects the premisses and various propositions logically deduced and suppresses the intermediate stages. There will be nothing fundamentally different in the relation between one pair of propositions of which one is a logical consequent of the other and another beyond the degree of complication of the deduction or the extent of the intermediate stages. The typical result to be found in logical investigation will then be of the form " $p$  implies  $q$ ," where the complete investigation would, in general, require the introduction of a number of intermediate propositions  $q_1, q_2, \dots q_r$ , so that the more complete statement of the result would be " $p$  implies  $q_1$  which in turn implies  $q_2$  which again implies  $q_3 \dots$  which implies  $q_r$  and  $q_r$  implies  $q$ ." And as we have seen except in sciences which are still in their infancy, the deductions which are relevant are seldom of a very simple form. The deductions required in the construction of the quantum theory could only be comprehended after some very serious study of certain kinds of logical deductions. Consider what it is that is really happening when a student is training himself as a logician. As a child he learns to add without counting on his fingers: he learns to jump from one

point in a sum to another without making the intermediate steps explicit. Much, of course, in the education of the child consists merely in the formation of habits and this fact introduces many complications into taking such an example as this. But whether it is through habits or in some other way, the ability to reason correctly in difficult subjects consists merely in the capacity to appreciate the cogency not of simple logical deductions only, but of the more complicated logical processes which are relevant in the more highly developed branches of science. Progress is made in a technical subject such as the theory of combinations, permutations, and distributions when deductions are pushed to greater and greater complexity, when the consequences of the results which previously marked the outskirts of the subject are worked out, and when the starting point of the subject is shifted backwards so as to include still more general ideas. But we must point out the well established form of single logical propositions before investigating further the structure of these deductions.

We remarked that the definition of logical propositions has not yet been effected. In spite of this, one mark of a logical proposition is well recognized. A proposition can only be a proposition of logic if it is a universal proposition in the sense that it can be applied to any suitable object. The well worn example of  $2+2=4$  which for our purposes may be looked upon as a proposition whose truth is guaranteed by logic, is applicable to children or typewriters, sweets or cigarettes, men or women. If we press the question further we shall find that the propositions of geometry afford, perhaps, the best illustration of logical propositions. And we must make it quite clear that it is pure geometry, which is indeed merely a certain class of logical propositions, to which we refer and not mensuration which is the science which is used in surveying and in agriculture. Professor Whitehead in his tract on *Projective Geometry* (p. 4), defines geometry in the following way: "Given any class of entities K, the sub classes of K form a

new class of classes: the science of classification (i.e. geometry) is the study of sets of classes selected from this new class so as to possess certain properties." He goes on to cite the Aristotelian system of classification by species and genera as a geometry in which the properties to be possessed by the sub-classes of K are (1) that of being mutually exclusive and (2) that of exhausting K. Certain characteristics of logical propositions of this kind are then plain. They deal with the relations between properties. Professor Whitehead's book, *An Enquiry concerning the Principles of Natural Knowledge*, gives further examples which again are of the same form. His theory of the system of the relation of extension is simply and solely the working out of the properties which are possessed by any term to which certain properties belong. This, then, is indeed the form of all logical deductions. They establish correlations between different properties. When a fundamental theorem such as von Straudt's theorem is established, it is really the fact that a certain set of properties involves certain other properties which is established.

The subject matter of logic is therefore the relations between sets of properties. This fact has important consequences: for the economical statement of these relations necessitates often a great deal of re-statement of the properties. But to make this point clear, we must return to a remark made in the earlier part of this paper.

We said that physical ideas were short-hand symbols for certain sets of properties. Geometrical ideas also stand for sets of properties. A statement to the effect that similar triangles have their sides proportional is an example from geometry. We have an impression of what is meant by a pair of similar triangles: similar triangles are objects with certain properties. We assert that whenever such objects are in question, we are dealing also with a pair of triangles whose sides are proportional. There is a definite advantage in having names for things, as in the case of similar triangles, and the

deductions which are established affirm the necessary dependence of certain properties, on the properties connoted by the name in question. Part of the aim of a complete inquiry will be the discovery of all the properties entailed by the sets of properties connoted by various names or ideas. The resulting propositions will be of the form: Similar triangles have their sides proportional: an isosceles triangle has two angles equal: parallelograms between the same parallels and on the same base are equal. But this is not the whole aim. The elegant construction of the results of logic is only possible if the ideas to which we give names are suitably chosen. As Professor Whitehead says in his tract (*ibid.*, p. 3): "Definitions—though in form they remain the mere assignment of names—are at once seen to be the most important part of the subject." For upon the ideas, to which names have been given, the subsequent deductions depend. In the construction of a body of logical knowledge, definitions may frequently have to be modified. Consider now the nature of physical ideas and we see a close parallel. The propositions of physics assert that certain properties are true of certain things—that electricity resides on the surface of a conductor; that matter attracts matter according to the inverse square law; that the cohesive force between particules of matter is residual intermolecular force of electrical origin [due to the fact that a molecule does not absolutely strictly speaking behave as if it were unchanged in its effects on very near particles though at longer distances away it does]. Now every single physical idea by analytical study is shown to stand for a class of properties. What is electricity? That inquiry is not in line with modern physical notions. We describe its behaviour. The vitalists ask the question, "What is Life"? and we sometimes come across the questions, "What is Mind"? or "What is Matter"? To accomplish the scientific development of the various subjects we should ask, "What are the properties of Life"? or "How does Matter behave"? It is significant that

modern analytical psychology, which is making rapid progress, has seen the importance of this form of question.

It is clearness as regards the properties which define the behaviour of Life or Mind which is of vital importance. What they are themselves is best left until a later stage. Enormous progress has been made in physics, and it is still by no means plain in what positive electricity, and thence matter itself, consists. Its behaviour under a multitude of circumstances can be accurately predicted, but its essential nature has yet to be laid bare. It is the collection of the properties of things which leads to the formation of physical ideas. The most important progress in science has come through the consideration of the logical consequences of attributing certain more or less abstract properties to classes of objects, and since the classes of objects are themselves defined by means of properties, the central notion is of the co-existence of sets of properties.

The fundamental and considerable hypotheses in modern science are of this form. It is immaterial in which direction one turns. The Darwinian hypothesis is of this form, and workers on it must seek either to verify or contradict it and the deductions to be made from it. And such empirical generalizations must deal with the relation between properties. The quantum hypothesis reveals the same structure — and countless other examples might be given. The theory of relativity, however, provides possibly the best illustration.

At a first glance this close parallelism between the structure of logical and physical ideas may well provoke comment. It exists because logic is, as we have explained, the general theory of all the possibilities that exist. The propositions of logic comprise all the possible cases which can occur. In the external world whatever happens must be possible logically. If logic says that two properties,  $\phi$  and  $\psi$ , cannot co-exist, we shall not find in the world a case of  $\phi$  and  $\psi$  being properties of the same thing. The characteristics of being

logically possible is a necessary condition of actual happenings. [We do not yet know what we must add to the condition that an actual happening must be logically possible in order to specify the sufficient conditions rather than merely those which are necessary.]

Physical ideas are merely bundles of properties. Hence the construction of physical ideas which is a vital part of scientific practice is useful in the following way. If the set of properties which is represented by a certain physical idea are sufficiently abstract or formal, logic itself will have various suggestions to offer as to what other properties should accompany them and which should never co-exist with them. In the theory of relativity there were held to be three tests. There was the question of the large discordance in the motion of the perihelion of Mercury. [It may be inexpedient to call this a test since the fact in question was well established before the relativity theory was put forward. But since there is no trace of forced agreement between this physical fact and the theory it is strictly speaking a test in that the probability to be assigned to the theory of relativity when the fact is taken into account is different from its prior probability.] Next comes the deflection of a ray of light by a gravitational field. The theory predicted a deflection of 1.74 seconds of angular measure for a star seen close to the limb of the sun. This prediction was tested in 1919 independently at two stations and values 1.61 and 1.98 were obtained, results which those competent to judge consider satisfactory. The third test was with respect to the vibrations of an atom in a gravitational field. The theory involves the consequence that the atom vibrates more slowly on the sun than on the earth and hence that the lines of the solar spectrum (which represent the frequency of the vibrations) should be displaced towards the red. It has now been proved that no such displacement can be registered owing to the presence of a source of error for which the limits of error are larger than the predicted shift. Now these three predictions are related to the

hypotheses of relativity by pure logic alone. No physics is involved. The physics enters in assuming that the hypothesis is true of our world. We find it convenient, for instance, to call stuff with certain properties matter and meaning by matter these properties (which in relativity theory are very abstract and formal in their nature) we can test the adequacy of the conception by investigating how far the properties which should result do indeed characterize the material under discussion.

It is, however, evident that much will depend upon the degree of abstractness of the properties involved. For the most remarkable results have so far been obtained only when the properties involved have been so abstract that a considerable technique has had to be developed for the adequate working out of their implications. Very often it has been the case that the technique required has been so complicated that science has had to wait for a long time before the results obtained without strict logical argument have been placed on an unassailable foundation. An example may be cited in the modern Lebesgue theory of integration. The theory of integration has, of course, been fundamental in very large domains of science for a considerable period of time, though it has only been placed on a really firm foundation of logic in the recent work of Lebesgue and others.

The fact that integration played a vital part in scientific work before it was itself in an unassailable position offers an illustration of a very interesting fact. As we have explained, a concept such as a curve, or a whole number, or a boiling point or a specific gravity represents a set of properties. The logical development of all the consequences of the possession of sets of properties (as we have seen in the case of the properties involved in relativity theory) is very frequently of extreme difficulty. But by means of physical phenomena, some of these consequences are often suggested in a sufficiently definite manner for them to be made use of in scientific work pending the establishing of the transitions on a logical basis. It is clear



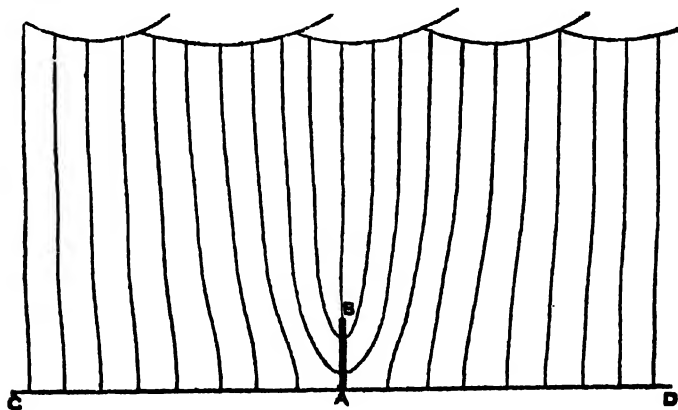
why this should be so. No one doubts that certain phenomena occur as consequences of the occurrence of certain other phenomena. And this is a result of the logical principles governing the world. Thus some properties are related to others and we may notice that certain properties always occur together in the world. A continual repetition of these circumstances will suggest their connexion and for all practical purposes we provisionally group them together. Sometimes we notice the simultaneous occurrence of certain properties on many occasions, only to find subsequently some case of the occurrence of one of them alone which at once cuts out the generalization we were about to make. Properties which occur simultaneously on a certain number of occasions may or may not be logically connected. But many cases have occurred when properties have been noticed occurring simultaneously and an intimate connexion between them has been assumed, and subsequent researches have shown the logical necessity of this connexion. In view of the enormous difficulty of establishing logical connexions between propositions in many cases, it is easy to see why such generalizations based on experience often hold the field for a considerable time before the logical construction of the subject is effected. This has been the case in the domain of geometry and mensuration. Furthermore, it is plain that such generalizations sometimes turn out false guides and sometimes foreshadow very adequately the logical developments of later times.

It must however be pointed out, that the aim of science cannot be attained unless these generalizations from experience are strictly related to the hypotheses. A certain generalization may be true, but science seeks to order all our ideas about the universe and to relate our generalizations among themselves so that they follow inevitably from the smallest number of unexplained and unexplainable primitive assumptions. It can therefore only be a temporary stage when our physical inductions are allowed to dominate certain branches of science,

although it is very often and indeed, probably, always a stage which cannot be avoided in the scientific study of any group of phenomena.

It is then very plausible to suppose that it is the study of formal and abstract properties which will be relevant in bringing about the greatest advances in science. And in connexion with this suggestion, the process of analogy can profitably be considered. We have already described the deduction by means of probability inference of the likelihood of a property  $\phi$  belonging to a subject  $a$ , if  $a$  possesses the properties  $\psi_1, \psi_2 \dots \psi_n$  and a subject  $b$  possessing the properties  $\psi_1, \psi_2 \dots \psi_n$  also possesses the property  $\phi$ . This process is often referred to by the term analogy. There is, however, a process entirely different which is often called by the same name. We will for convenience call it True Analogy. It is a complicated matter to explain, but it is of vital importance in the higher developments of the scientific study of any set of phenomena whatsoever. Its explanation must therefore be attempted; and this can best be done by means of an example.

In the science of electrostatics there occurs the following problem. If a conductor consisting of a sharp straight edge be placed in any field of force what is the modified field of force



in its immediate neighbourhood? This is the problem before the architect designing a lightning conductor, AB, to be placed on CD the flat roof of a house, and the solution is worked out in mathematics with precision. The diagram shows the lines of electric discharge from clouds during a storm. Now in thermodynamics the architect or the botanist may wish to know the distribution of temperature, say in a large gallery or greenhouse with hot water pipes along the side, CD, and a special heating apparatus, AB, at some point along the wall. If the physical conditions are suitably adjusted, one and the same solution will serve for either problem. The curves along which the temperature decreases most rapidly are just the curves which indicate the lines of force in the electrical problem, and the isotherms in the greenhouse will be the lines of constant potential in the electrical problem.\*

Physics is full of examples of this kind of identity of solution. There are numberless problems of electrostatics whose solution covers problems in hydrodynamics and current electricity and thermodynamics. Many important problems in the theory of gravitational attraction can be solved by a consideration of problems in electrostatics. The reason for this overwhelmingly important fact is to be found in the identity of the formal properties relevant in the various domains.

The gravitational law is that of the inverse square; the law of electrical attraction (though in this case there is attraction between the electricity of different kinds and repulsion between electricity of the same kind) is also that of the inverse square.

It was only after a great deal of research that the identity of these various problems was seen, and only after much more work had been done that the reason for it was made explicit. The term TRUE ANALOGY may conveniently be used to cover this extremely important process by which we obtain knowledge of one set of phenomena by means of knowledge of a

---

\* The diagram is reproduced from J. H. Jeans's *Electricity and Magnetism*, Cambridge University Press, by kind permission.

different set of phenomena, through an identity of formal characters in the two cases.

This is, I think, in essence the account to be given of true analogy. Physicists use the principle in every branch of their science, and yet when challenged, frequently find it difficult to defend their position. This is because analogy (which, though important in science in an elementary stage of development, is, like induction by simple enumeration, at best a poor instrument for fundamental researches), and true analogy are often confounded. The part paid by probability in the one makes it necessary to limit ourselves to the probability of the resulting propositions. The absence of probability principles in the other makes it possible to assert the corresponding results without reservation. And the caution necessary and highly expedient when we are dealing with the one is unnecessary and misapplied when we are dealing with the latter. Lest, however, an embarrassing interpretation be put on these remarks, we must state explicitly what form of results will be obtained by the use of true analogy. In the specific case we adopted as our expository illustration, it would run thus: assuming that the lines of force and the equipotentials in the electrical case have certain formal properties in space and on the line CD the lines of force and the equipotential lines must be given by certain equations,  $E_1$  and  $E_2$  respectively. Assuming that the lines of flow in the thermodynamical problem also have similar properties to the equipotentials in the electrical problem, the lines of flow must be similar to the equipotentials in the electrical problem. The question of the plausibility of assuming that the premisses in these statements are true still remains. They are, in the case we have taken, very particular cases of an extremely general assumption. The propositions which can be asserted can be asserted without reservation, and they are independent of probability principles. These will come in when the assertion of the premisses alone is under consideration.

The fundamental progress in electrostatics and magnetism

and current electricity is largely due to the genius of Maxwell who saw the formal resemblances between the conditions to be satisfied in such problems in the light of Faraday's experiments, and those satisfied in the hitherto solved problems in other domains.

This insight had great results. It made available for the treatment of electrical problems the masterly apparatus developed by Green, Poisson, Laplace, De Saint Venant, and others, arising out of the needs of such subjects as elasticity, and thereby laid bare the intimate and yet extremely complicated relation which probably exists between various phenomena, physically entirely distinct. One example will show what I mean. The well-known experiment devised by Cavendish, and repeated by Maxwell in a more delicate form, with concentric metal shells, established as an empirical generalization the result that there is no charge inside a conductor placed in an electrical field. It is known mathematically that an inverse square law is sufficient and necessary to account for this. The inverse square law for electric charges was experimentally established by Cavendish and Coulomb by means of the torsion balance.

This proposition can be stated in stricter logical form in such a way that it is clear that no physical ideas are involved, only with great elaboration. This relating of the two experimental results is typical of the way in which the propositions of logic co-ordinate, and reduce to a closely-woven structure different classes of physical phenomena. For evermore, only one of these two properties of electricity need be considered as unexplained, for one property carries the other property with it with the same inevitableness as the taking away of one nigger boy from the happy ten left only nine. This grouping of phenomena into sets, and ordering of the various sets *inter se* so that the residuum which cries out for explanation is as small as possible, is the aim of all those who try to add to the body of scientific truth.

*Meeting of the Aristotelian Society at 21, Gower Street, W.C. 1,  
on July 4th, 1921, at 8 P.M.*

## IX.—ON ARGUING IN A CIRCLE.

*By F. C. S. SCHILLER.*

HISTORY relates that *Noli turbare circulos meos!* was the reply of Archimedes to the Roman ruffian whose rude retort postponed the application of science to reality for some 2,000 years. But the remark might have been addressed, still more aptly, by Plato to Aristotle, if he had become cognizant of the latter's endeavours to formulate a formal science of Logic, and had foreseen the effect it would have on his own way of philosophizing, and, indeed, on that of all who boast themselves to be "true philosophers." For your true philosopher is a lover of system, and every system seems to be a globular whole, within which rectilinear motion is not possible. Once he has ensconced himself in a system, therefore, he argues in a circle. For all his arguments fall within the system, and turn upon it. Within it he is safe enough, for various reasons.

(1) A system is a highly individual product, and one mind differs sufficiently from another to render it very difficult for one philosopher to enter into the system of another, and to come into logical conflict with it. Especially (2) if the other has taken, as he usually has, the simple precaution of enveloping himself in a sufficiently technical terminology, either invented *ad hoc* by himself, or at least employing borrowed technicalities in some peculiar sense diverging sufficiently from earlier uses to put out the rash intruder.

(3) It is by no means easy to attack a system from without. If you bombard it with "facts" external to it, it either denies or ignores them. For if it claims to be all-embracing, it need not recognize any *external* fact. Or else it absorbs and assimilates them, and grows more comprehensive by transmuting them. Even if you succeed in damaging an actual

system, you do no hurt to the "ideal" system, of which it then modestly professes to be the earthly representative—by "approximation." For the ideal system is all-embracing—by definition—and no "fact" can stay without it. It can do, therefore, all that the actual system cannot, and guarantees it by "participation." When one system is attacked by another, the result is equally indecisive. Their collision is like that between the irresistible force and the insuperable obstacle. That is, both rebound with the complacent elasticity that used to be ascribed to "atoms," and go on gyrating as before.

Hence (4) a system, like a modern "atom," can only be disrupted from within, and even that only if its creator, at its core, grows dissatisfied with it. For it is vain to accuse it *ab extra* of logical crimes, of inconsistency, incoherence, or contradiction, unless he himself feels these defects. And this he can never be compelled to do. For he always has his "vision," his intimate conviction of the truth, beauty, goodness, and greatness of his system, and, as he gazes upon this, he overlooks all else. Now this vision is never merely intellectual; it is always emotional, and often ecstatic and highly mystical. From it there always exudes enough glue or psychological cement to patch up the system, to bridge its logical chasms, to reunite its rifts, to declare unreal or verbal the "contradictions" it envelops. In the last resort a philosopher can always take refuge in a "final inexplicability," which any "finite mind" may own to without much loss of "face."

It is no wonder, therefore, that metaphysicians can go on from age to age revolving happily within the orbits of their "systems," concerned only with the same old "problems" and the stale old phrases (which mean all the world to them and nothing to any one else), unperturbed by the vicissitudes of life and science.

But, alas, not unperturbed by Logic. Logic, in all its essential features an Aristotelian invention, descended out of the blue upon the pre-logical world of metaphysics, like a high

explosive bomb, and threatened to blow it to bits. It would have done so effectively, if the "ideal" of "system" had been logical, and if metaphysics were amenable to reason. But as they are essentially "visions," Logic made little difference. Metaphysicians continued to imitate Plato, to search for an all-embracing, all-explaining principle, and generally to reflect his vision, as if Formal Logic had never been invented. The Aristotelian criticism of the Platonic ideal simply added one to the interminable disputes that constitute the history of philosophy.

Naturally, however, these contentions will not readily be admitted. They are not flattering to philosophic vanity. Nevertheless the attempt must be made to establish them by logical reasoning, if only to illustrate the impotence of logical reasoning when it encounters bias. In this way the very rejection of our logical objections will reveal the truth, and verify our contentions.

I propose, therefore, to consider, I, the ideal of system as it was conceived by Plato; II, the bearing on it of the Aristotelian fallacy of arguing in a circle; III, the relations between arguing in a circle and arguing in a system; IV, the value of the idea of system as an account of logical reasoning; V, its relation to that of the "universe"; VI, the conclusions that result as to the nature and value of Logic.

# I.

Some time about the culmination of his philosophic career Plato had a glorious vision, which seemed to reveal to him a method of perfecting the harmony of the Ideal World of True Being. Until then his philosophizing, though always animated by a passionate revulsion from the flux and instability of the senses and a craving for the security and certainty of unchanging objects of thought, might have been regarded as concerned only with the cognitive function of universals, and as earth-bound by the shackles of mere logic. But after he had once beheld the Beatific Vision of the greatest of the objects of knowledge, the Good, he could soar, and revel in the radiance of the



Supreme Source of all Being and certainty and of the ultimate object of every soul's desire.\* An easy and natural extension of the organizing function he had ascribed to the Idea in relation to the sensible leads directly to the thought of a Super-Idea, to organize the Ideal world also. Plato had all along cherished the Idea as the solution of the problem of the one and the many, as the principle of order amid the chaos of sensibles; but he had not apparently recognized at first that if the Ideas were left a mere plurality, this same problem would recur in the "intelligible" world. Not only is there "participation" between sensible and Idea, but between Idea and Idea; such relations, therefore, will appear to infect the Idea with plurality, and will disguise its essential unity. Awkward questions will arise how the circle can have the property of cutting another circle in two points if there is only *one* circle, how 2 and 2 can make 4, if there is only *one* 2, or how far the ideality of his organs will really reconcile the Ideal Man to having only one leg, one eye, one arm, and one tooth!

Accordingly, Plato had to recognize a *κοινωνία εἰδῶν*, a community or *system* of Ideas, to save the Ideal Theory.† But to do so is in principle to raise a question as to the one that holds the many together and forms them into a system. The ultimate character of the system will clearly depend on how its organizing principle is formulated. Now this question, though in itself quite a good logical question, may be answered in a variety of ways, and it is only by his specific answer to it that Plato transcends the bounds of logic. He does so, moreover, not because he wrote in ignorance of logical canons not yet formulated by Aristotle, but because he desired to systematize the Ideas in one way and not in another.

Thus, he need not have conceived the union of the many in a monistic and monarchic fashion; he might have developed the original pluralism of his Ideas into a harmonious common-

---

\* *Republic*, 505 E.

† *Republic*, 476 A.

wealth. He need not have conceived the relation of the parts to the whole as teleological; he could have left the connexions of his system merely causal and mechanical. He need not have ascribed the unification of the Ideas to a logical process; he might have found a more mystic bond of union in affection or emotion, such as Aristotle subsequently postulated when he made his Prime Mover the universal object of desire. He need not have assimilated the relations of the Ideas to the Good to the forms of logical proof, or have suggested that their dependence on the Good was the dependence of a logically posterior on a logically prior: the result was that the ascent through "hypotheses" to the Supreme Good became an anticipation of what was later called "induction," while the descent of pure thought to the outermost borders of the intelligible world became an attractive (though elusive) model of purely *a priori* deduction. And having thus, unwisely, appealed to logic, the Platonic system could hardly reject the verdict of Aristotelian criticism.

It deserves to be noted, further, that Plato's vision of a complete synopsis of the Intelligible World in the light of the Good is not to be regarded merely as a glorification of the idea of system: it is both much more and perceptibly less. It transcends the bare notion of system, in that it expresses also the "metaphysical craving for unity," *alias* the human longing for magical master-keys and panaceas, the human demand for a teleology akin to human motivation, and the human claim to sit in judgment on the world, and to appraise its *value*. The attempt to view the intelligible world as a system need not have involved all this: value and teleology are *not* necessary implications of "system," the idea of which, as in Spinozism or materialism, might have declared itself satisfied with an equilibrium of mechanical forces constitutionally insensitive to human valuations.

On the other hand, the Platonic synthesis falls short of the full ideal of "system" in several respects. For all its aspiration

to unity, the Platonic system does *not* attain to a monistic metaphysic. It fails to unify the intelligible and the sensible, and though the latter is condemned *per contumaciam* to not-Being (unreality), it remains such a very positive stuff (ὄλῃ) that the initial values are reversed. Platonism remains a dualism, and instead of having Being and not-Being as its ultimate terms, really rests on Stuff and Non-sense. Secondly, the relation of the Good and the Ideas never becomes one of mere mutual implication. The Good always retains its logical priority, and transcends Being (the Ideas) in dignity and power.\* Nor does it draw its truth and strength ("validity") from the completeness and success of its system. Its apprehension is *not* conceived as a logical process; for the "destruction" of inadequate "hypotheses," which is to precede its discovery, cannot, as such, lead to any *positive* conception, nor can their inadequacy be either revealed or remedied, until the Good has been grasped. It is only the "unhypothetical principle" that renders the principles of the sciences truly intelligible.† Hence to grasp the Good is rather an act of divination, to which the divinely-gifted philosophic soul is stirred by its ascetic training in the sciences which the Kallipolis approves; and when it has been grasped, its truth depends on its intuitive, æsthetic, self-evidence, rather than on the support of its system. Hence rational proof or insight never quite becomes for Plato, as for modern systematists, anything that can fairly be called argument in a circle or in a system.

## II.

This, however, is not by any means to say that the difficulty of distinguishing these two forms of reasoning‡ is not relevant to the Platonic system, and that it has nothing to fear from Aristotelian logic. For just those features which

---

\* *Republic*, 509 B.

† *Republic*, 511 B, D.

‡ Cf. *Formal Logic*, p. 360.

should acquit it of the charge of arguing in a circle, *viz.*, the priority and intuitive self-evidence of its principle, the non-reciprocating character of its relations with the derivative Ideas, and its mimicry of "proof," render it the more obnoxious to the accusation that it commits an elementary blunder in logic, and really rests upon a complete misconception (or rather ignorance) of the nature of proof. Does not the Platonic "dialectic" set itself the impossible task of exhibiting a *rational* dependence of all the Ideas on *one* principle, which is to be the single self-sufficient and all-sufficient presupposition and premiss of all rational connexion? For the second premiss of the Platonic metaphysic is here unavailable: "matter" or "not-being," though it may explain the distortion of "being" in the sensible, is not capable of entering into a logical process or of receiving rational explanation. So the whole rationality of the world rests solely upon the Good: it is drawn from this one premiss: but, if so, can it be said to be proved? Must not the logician formally protest that all proof necessitates *two* premisses?

The objection threatens to be fatal, but we may have recourse to subterfuge. Our boldest course would be to repudiate formal logic altogether, and in the end it may also be the safest. But if we do not venture upon so open a breach with the tradition, and so on a complete reconstruction of logic, we may find (at least temporary) shelter in the idea of "system," and can then say, this is all that Plato really meant. We shall thereupon be charged, of course, by formal logic, with arguing in a circle. But we can meet this charge, if we can discover a valid distinction between arguing in a system and in a circle. In this endeavour we may even rely on the co-operation of our critics, who, sooth to say, are in the same hole. For the Aristotelian accounts of the "fallacy" of begging the question\* were all based on the assumption of

\* *An. Prior*, II, 16; *An. Post*, I, 3; *Topica*, VIII, 17.

a natural logical order, "prior" and "posterior." They do not easily apply to a system which appears to support itself by its own "coherence," and in which no part is naturally prior to another, because the principles are just as much verified by the consequences deduced from them as they guarantee the deductions. As such systems undoubtedly exist (in every science), it becomes imperative to explore their logical character. The reluctance of logicians to do so in plain language may most probably be set down to a suspicion that, if they were too thorough, they might wreck alike formal logic and the substitutes that mimic it, and might have to jettison the notions both of "formal validity" and of "system," and so reveal too openly the bareness and sterility of the ground on which they had taken their last stand.

### III.

This fear, however, should not deter us. We shall consider (1) why systematic coherence should be proposed as a substitute for deductive proof from premisses which are "prior" in their own right to their conclusions (and more certain), (2) why it should be a "fallacy" to argue in a circle, and why *some* circles should flagrantly be "vicious," (3) why a "valid" reasoning and a "fallacy" should be at first sight indistinguishable

(1) So soon as logic pays any attention to the actual procedure of the sciences, it becomes plain that neither the Platonic account thereof nor its revised version in Aristotle is really borne out by the facts. It is only superficially that the sciences rest on unproved assumptions (Plato's "hypotheses"), that cry out for validation by deduction from a metaphysical principle. Nor do they draw their support from a host of general principles and special assumptions, all of them self-evidently and absolutely true *per se*, from which the facts of the sciences are deducible by demonstration, as Aristotle contended. Their principles *were* hypotheses once, having been assumed tentatively and experimentally, in order to explore a

subject of scientific interest. But they are not, in any real sense, hypotheses any longer. They have emerged successfully from a severe and prolonged struggle for existence, which has purged away unsuitable assumptions. They are *proved*, because they have *approved* themselves as proper principles for use in their sciences. They have been proved by the consequences they have led to, and the scientific value they have developed. But their truth is never "absolute." It is essentially a *recognition of their services*, and a title that is retained by the same tenure as generated it, *viz.*, their continued superiority to any rival and alternative. In a word, their truth is, and remains, *pragmatic*, though it exhibits pragmatic truth at its strongest and in its most "valid" form.

Similarly, the truths and "facts" of the sciences are not merely inferences drawn from the superior truth of the "principles," but substantial and logically essential supports of the science. For they supplied the field of operations which tested and selected the principles that were tried, and in consequence adopted as suitable. The actual character of the science, therefore, was determined by the interaction and mutual accommodation of "facts" and "principles." *Now* every science has become self-supporting and practically autonomous. It resents the intrusions of merely metaphysical criticism and repels the philosophic raider. It will not admit that its truth depends on any metaphysical deduction *a priori*, but shows how it grew up *a posteriori*, and now rests on the cohesion of its constituents, and its general adequacy to the functions it is required to perform. Its principles are "true," in short, because they have led to a successfully-working science; its facts are true because they effectively cooperate with its principles, which successfully "explain" them. Together they form a well-knit well-ordered whole, which presents a united front to the outside critic. He has practically to accept it as a whole, unless he can penetrate into the system and suggests internal readjustments which are scientifically advantageous.

For these always remain admissible, because a scientific system never claims to be fixed and final. Still the outside critic cannot often suggest improvements in a scientific system. He has to take it or leave it, and if he rejects it, he can do so only at the cost of losing whatever *values* the science has produced, and of abandoning whatever *purpose* it fulfilled. Practically, therefore, its position is unassailable.

We can now see both why such a coherent system should be taken as true, and how it forms a ground for inferences. We can argue up it and down it and all over it, not indeed in fixed ruts of formal necessity founded upon adamant fact, but with adequate assurance that the ground we traverse will prove continuous and sufficiently solid to sustain our operations. The system will support us in travelling from any part of it to any other. We can, therefore, argue either that its principles are true because they lead to such excellent scientific consequences, or that the facts are true because they follow so simply from the principles.

*For psychological reasons* many, doubtless, will be apt to add that *only* these principles could lead to these consequences and explain these facts. But this would be an exaggeration, and goes beyond the facts. It is often quite untrue, though dogmatists and writers of text-books try hard to slur it over, that only *one* set of principles is available in a science (*cf.* the various sorts of geometry and the choice between teleology and mechanism in biology); it is quite enough to claim that the accepted principles are the *best*. They are certainly the reputed best. Also they can *never* claim to be more than the-only-ones-that-have-commended-themselves-up-to-date.

A sober logician, therefore, would be careful to note exactly how much the existence of scientific systems proved. He would recognize (*a*) that all these systems were so far *partial*, as originating in the delimitation of subjects of interest and the selection of problems; (*b*) that their cohesion and their truth were not self-sufficing and intrinsic qualities of systems as such,

and pertained to them, not *qua* systematic, but *qua* relative to a purpose and a use or application, to wit the use and purpose which developed the science, tested the truth-claims in it, and discriminated the good from the bad. He would not, therefore, (c) infer that he was entitled, without more ado, to proclaim, or even to postulate, an all-embracing system, which was absolutely true *in virtue of its form*, i.e., simply because it was a system. He would feel that this would involve a change of method and that many cases had first to be examined. Was it not possible, e.g., that *two* systems might be equally coherent and comprehensive, and yet differ so profoundly in *value* that the one might be judged true, and the other a gigantic illusion? The case of pessimism and optimism was notorious. Or again might not two systems *both* be true relatively to different types of purpose (say scientific and aesthetic), or even of mind or organization (cf. Aristotle's remark that the good is not the same for men and fishes, *Eth. Nic.*, vi., 7. 4)? Or lastly, would not *all* (human) systems be (necessarily) false, just because only one absolutely all-comprehending system could on this theory be true? And would he not wish to inquire further into the attempt to escape from this sceptical implication by evasive doctrines of "approximations" and "degrees of truth"? At any rate until he was ready to draw such unwarranted inferences, he would remain in doubt whether the notion of "system" was really a logical panacea, or even an improvement on the "valid forms" of the old logic.

(2) When a man "argues in a circle," unwittingly and in good faith, he undoubtedly believes himself to be arguing in a system of the kind we have examined. He does not believe that the whole, or any part, of his system is false, but, believing that the system as a whole is unchallenged, he is trying to show that it guarantees its disputed parts. The objection to his procedure therefore means that he is mistaken in *this* belief. The *whole* of his system is challenged, and involved in doubt. It is vain therefore for him to appeal to any part of it



to support the rest. He must get *outside* support, and subject his system to an independent test. What kind of test will validate his system, and so the conclusion he desires to draw, depends of course on the particular objector's point. He may be willing to allow an appeal to a fact both parties recognize. He may allow an appeal to a principle of admitted truth. He may consent to include the disputed system in a larger one which he does *not* dispute. What he does *not* accept is the *ipse dixit* of a system which he condemns as logically insufficient.

It would seem to follow that the real difference between argument in a system and in a circle, the real objection to circular reasoning, is that the latter refuses satisfaction to those who honestly dispute its claim to truth. The "circular" system shuts itself up in its borders and "closes its frontiers": it is a *closed* system that will not listen to objections nor lend an open ear to reasoning it regards as hostile. It refuses to extend itself to anything extraneous, and to submit to any further test. Herein consists its "viciousness."

On the other hand it would seem to be impossible to "argue in a circle" where the system is kept *open*, able and willing to accept extension, revision or correction, either because it is conscious of its fallibility and incompleteness, or because it is only *held experimentally*, to test a truth-claim and "for the sake of the argument." For in such cases there will be no reluctance to admit that the very fact that a system is challenged is proof enough that it is not wholly satisfactory, and reason enough for attempting to improve it. Thus "open" systems, such as we have seen the sciences to be, always have a certain elasticity or contingency which debars their reasonings from claiming formal validity, but enables them to adjust themselves to new facts and points of view and to changing conditions, and so to rebut the charge of circularity. They remain open to reason and to reasoning, and only "closed" circles are really "vicious."

"But are not they alone *perfect* circles, and perfect systems?" a formal logician might object. He is right; the mutual implication of the parts can never be assumed to be rigidly necessary in an "open" system, and such a "system" is not perfectly systematic. But such implication is a double-edged tool, and a wise logician will think twice before he plays with it. It seems at first to yield a superior guarantee. But if no part in a rigid system is *less* certain than another, neither is any part *more* certain. Hence any flaw anywhere weakens the whole, and dissatisfaction with any part provokes universal distrust and revolt. It is not doing science a good service to persuade it to conceive its systems as closed and rigid. An *aut Caesar aut nihil* policy may in these days lead to an overthrow of Caesarisms.

(3) It is now easy to see why a "valid" reasoning in a system and a "fallacious" argument in a circle should resemble each other so deceptively. There is *no* formal distinction between them. The difference between them lies in the temper in which they are upheld, in the *animus* with which they are used, in the purposes of their makers, or, in short, in the minds of the reasoners, and not in the *form* of the reasoning. In other words, it lies in considerations which too many logicians insist on classifying as "psychological" and excluding from "logic." But it is clear that no sort of logic can afford to have many such reductions to absurdity proved against it.

#### IV.

Least of all the logic which pins its faith on system and has already swallowed far too many difficulties, which it must be requested to regurgitate and reconsider.

(1) It was shown above (§ III, *init.*) that the scientific systems, whose truth is universally admitted, are all of them *partial*. They do not profess to include all facts, but only those that are relevant to their interests. And this character was deeply ingrained in them by their mode of genesis. They

had all arisen by the focusing of attention on some special aspect of reality, by experimentation with principles suggested as applicable to it, by the delimitation of the frontiers between one science and other. Furthermore, such partiality was seen to be essential to their logical value. Unless a system is partial, it cannot appeal to anything outside it when challenged, unless it appeals to something outside it, it claims self-sufficiency, argues in a circle, and repudiates all tests of its truth, and unless it can suggest a test of its truth (-claim), it cannot remove any doubt and prove itself. How then can it have logical value, unless it is partial?

It is true, doubtless, that a challenged system may defend itself by accepting and assimilating an objection, and so transforming itself into a more comprehensive system. But it does not follow that the process can be continued indefinitely. For it is an expedient that is open *only* to a partial system. A complete system, or one that claimed completeness, obviously could not so defend itself. For this reason alone the logician must distinguish between the complete system and the partial.

(2) The systems so far considered were all found to rest upon selections and to derive their scientific character from these. They all involved a discrimination between what was significant and relevant for their purpose and what was not. The latter is treated as if it did not exist, or did not matter, by a methodological fiction, which in the light of the consequences must be pronounced legitimate. But of course it should frankly be confessed that the selection made by a science always involves it in risk. An extremely bad selection may lead to its complete rejection as pseudo-science (*e.g.*, astrology). Inclusion of the irrelevant and exclusion of the relevant may always conduct to error and frustrate its purpose. It must always be shown that what it omitted was not relevant or even "essential." Moreover, the working of the science may always breed dissatisfaction within it; for the workers, being aware that they have selected, and desiring to include more, may

discern no way of doing so. In short, the practice of selection, with its confession of *risk*, is *prima facie* a formidable obstacle to the "ideal" of all-inclusive and inerrant system.

(3) The whole procedure of system-building has, so far, had to be represented as tentative and experimental. It aimed at the satisfaction of a will-to-know rather than at compulsion by a necessity of thought. For it was admittedly not necessary to "close" a system, to choose one rather than another, to organize it in one way rather than another. So neither fixity, nor finality, nor absoluteness in any sense, could be dogmatically claimed for it. Its structural principles were never more than methodological assumptions, and often remained such to the end. They could lay no claim to the status of ontological ultimates. And it seemed to be just because they were so unassuming that the sciences were so progressive.

(4) It is plain that these results threaten to pile up insuperable obstacles in the way of the ideal on which the notion of system seems chiefly to rest its claim to logical value. It hardly seems worth while to sacrifice to it the familiar forms of logical proof, if (a) there can be no all-embracing system that logic can attain, if (b) there can be no compulsion to make it obligatory and universal, and if (c) its very notion cannot be freed from incongruity and "contradiction." Yet all these damaging conclusions would seem to be not obscurely indicated.

(a) It sounds like a truism to declare that if there are partial systems, they must all be capable of coalescing into one vast all-embracing super-system, and that this, even if it cannot as yet be fully formulated, forms a valid, and indeed a necessary, ideal for human knowledge to conceive. For it and it alone, would be exempt from doubt and criticism, and so absolutely certain, because it would include and account for everything with which it was attempted to attack it.

Yet to argue thus would be to ignore the laws of systematic structures. It overlooks the fact that selection is *essential* to them. Now, no all-embracing system could possibly be selective.

*Ex vi definitionis*, it would have to accommodate literally everything. It would have to include, not merely the real *optimi juris*, but also every shade and phantom of unreality and "appearance," dream, hallucination, imagination, fiction, illusion, past, present, and to come; not merely the true in the "absolute" sense (if that can be found!), but all the struggling brands of inferior truth-claim, not excepting every sort and degree of error, falsity, lying, and delusion; not merely the good, but every shade and degree of evil and depravity. In short, nothing could be too common, filthy, and worthless to be taken up into the all-embracing, all-absorbing synthesis! But where is the human mind that would wittingly consent to undertake the impossible and repulsive task of forming a perfect system out of such a perfect chaos?

Certainly not among philosophers, who are most fastidious. Philosophic history reveals that all the metaphysical systems that were ever launched are in fact highly selective. They habitually use "real," not as an impartial label wherewith to recognize the given, but as a term of *valuation* with which they decorate what they approve, but *exclude* whatever is not congenial with the system, however insistently it claims to *be*. They claim to restrict "truth" to what they themselves believe and approve, but make provision neither for the future *improvement* of their own truth, nor for the correction of the "errors," in which the whole world of opinion outside the system continues to wallow. They shut their eyes to the very existence of evil, or are content to leave it a "mystery." In short the historic systems have satisfied none but their authors, precisely because they have *omitted* so much that others have thought of vital importance.

(b) Even, however, if a truly all-inclusive system could be conceived, it could not be universalized, and made coercive.

For (i) it would always have to leave open a choice of principles, wherewith to organize it. And the system would vary accordingly. Thus to mention only a few of the alterna-

tives, the structure of the system would be very different according as it conceived its connexions as teleological or causal, its events as determined or as indeterminate, its values as imputed by a pessimist, or by an optimist.

(ii) It would never be possible, therefore, to force upon a recalcitrant dissenter a choice between "this or nothing," and if the validity of inference really depended on such brow-beating, one would simply have to say that, fortunately for our freedom, "valid inference" was humanly impossible.

(iii) Nor could the inclusiveness of an interpretation of reality render it absolutely secure. Actually every interpretation is, and is likely to remain, in dispute; but even if *rational* dissent had been suppressed by so severely torturing the dissenter that he could no longer express himself in parliamentary language, he might still rebel at heart, and abominate the professed "synthesis," much as Prometheus could reject the works of Zeus. He could still *hope*, however "irrationally," for the unforeseen occurrence of some new fact, discovery, or invention, that would upset the "system" or the interpretation he resented. Even in a hell the actual can never be shorn of its halo of possibles. And even if he despaired, no compulsion, whether by fact or by reason, could ever force him to content himself or impair his right to value and to condemn.

Thus no version of the Whole could ever be logically indisputable. It could never be more than a plausible hypothesis, which might win assent by its attractiveness, but had no power to extort it.

(c) It may be argued that in the end the difficulties implied in the ideal of an all-inclusive Whole culminate in explicit self-contradiction.

(i) We have seen that the only known ways to distinguish between a legitimate argument in a system and a fallacious argument in a circle were by keeping the circle "open," so that it could be enlarged to take in well-grounded objections, or alternatively, by holding the proposed system hypothetically

and experimentally, and not absolutely and intransigently, so that it could be "scrapped," if a more satisfactory substitute could be found. But it is clear that neither of these methods of avoiding fallacy can be invoked on behalf of an absolute and all-embracing system. Such a system could not be enlarged, because it would already contain all that there is. If it can be enlarged, it cannot be all-embracing, *i.e.*, cannot be what it claims to be. The notion of "system" therefore has been rendered self-contradictory and fallacious by being made "all-embracing." Neither can its claim to truth be absolute, so long as it is possible to subject it to reinterpretation. An absolute system which is not final is self-contradictory.

(ii) It may also be shown that an all-embracing system becomes unmeaning, and, if it claims to rest on selections, contradictory. For partial systems get their meaning from selections and exclusions, and these cannot be undone without changing or destroying the meaning. For example the moral interpretation of the world, which is usually expressed in religious systems, rests on the antithesis of good and evil, on a selection of the former and a rejection of the latter, and on an assurance that good is somehow dominant. Of this assurance "God" is the usual vehicle. But if theology attempts to improve on this simple faith, and to make "God" something (apparently) greater, if it tries to conceive "God" as "all in all," it simply abolishes the application of moral predicates to God, and destroys the moral universe. The old meaning of "God" disappears with his old function, and "God" ceases to be distinguishable from "Devil," or rather *both* are merged in a "higher synthesis" which is beyond good and evil! The fate of the all-embracing system is similar. It is fabricated by abrogating all the selections that generated the partial systems; yet it professes to retain their method, and their structure, and the values they embodied. That the selective process which builds up systems should reach its completion

in the total abolition of selection is surely the acme of self-contradiction !

(iii) A similar incongruity arises out of the attempt to excise the relativity of the actual scientific systems to the human purposes and interests which guided their selections, and to make the all-inclusive system absolutely independent and self-sufficient. It is clear that the only ideal to which our actual sciences can validly point when universalized, is that of a system which is valuable for *all* purposes and relevant to *all* interests, and that such a system would be as different as possible from one that is independent of all purposes and indifferent to all interests. Hence an argument that starts from relativity to purpose and arrives at absoluteness has merely succeeded in contradicting the premisses it presupposed.

## V.

It may, however, reduce philosophic repugnance to these conclusions to show that the ideal of the complete system was not in any case susceptible of proof. Four main lines of argument conduct to this conclusion.

(1) Just because proof is held to depend on systematic connexion, the complete system is not capable of proof. The proofs must fall within it, and none can apply to the system itself. It is a corollary from this that a (partial) system can be proved only from without, and that if we reason in a system we can always be charged with arguing in a circle by those who reject the system.

(2) It is true that an all-embracing system could not be refuted, because it could not be attacked from without like a partial system, and in this case there is no without. But neither can its truth-claim be tested—for the same reason. Its claim to truth therefore remains a mere assertion which proves nothing. So far, therefore, from its being true that an argument becomes irrefragable when its circuit becomes as



large as the universe, it would then become indemonstrable and unmeaning.

Moreover it might easily become intolerable. For if the system were judged to be *bad*, it would become a vast prison, from which there could not indeed be any escape, but which need not be any the better for that. Its very completeness might increase the irritation it evoked, and excite an explosion in which it was wholly disrupted and dissolved. In other words the feelings might repudiate as absurd the conclusions of the reason, just because they were intellectually complete.

(3) It has been too easily taken for granted that the epistemological notion of system might safely be equated with the ontological idea of "the universe." Their distinctness is sufficiently attested by the possibility that either might exist without the other. The real might form a "universe," in point of fact, but nevertheless it might not be possible ever to *know* it enough to formulate an all-embracing system. Conversely, there might *be* no "universe," but only a universal *belief* in it. That is, we might all delude ourselves with the idea that we were (or might be) possessed of an all-embracing system, or as Professor Hoernlé puts it, with a "conviction of the wholeness of the universe." To perform this feat it would only be necessary to authorize the imagination to putty up the gaps in our actually fragmentary knowledge with postulates, and hopes, and "*a priori*" inferences. And the imagination would be only too delighted to fool us to the top of our bent!

The most that can really be made out in the way of a connexion between the ideas of "system" and of "universe" is that, taking experience as (possibly) a whole, we find in it encouragement enough to hope and believe that the fragments of knowledge it yields are really partial revelations of an integral reality, to which it refers, and on which it relies. Thus, even though our systems are *not* complete, we are justified in believing that they may be completed, because

they are rooted in a reality which *is* complete, or otherwise, because "the universe" is real.\*

It is to be noticed, however, that in this plea the logical "system" has become *hypothetical*, and seeks ontological salvation in the notion of "universe." That is to say its "substance" (*ὑπόστασις*, i.e., *support*, cf. *Hebr.* xi, 1) lies in the region of "things hoped for," and the pretence to a coercive "necessity of thought" has been abandoned. It is, at best, a *postulate*, and lucky if it does not become a self-defeating one. At any rate it is logically dependent on the reality of "the universe."

Now the latter is a separate question which must be discussed on its own merits. It means the question whether the real can be successfully interpreted by our notion of "universe," and properly said to be, or to form, a "universe." This is a very important question, which should not be assumed, but ought to be proved. It is certainly not easy to prove, and may not be true.

Now that the real, as we encounter it in our experience, really forms a whole or universe, is anything but an obvious and self-evident truth. It could hardly occur to a dispassionate intelligence that merely sought to "contemplate reality," and had no desire to value or to select, and nothing to gain or to lose by its operations. Such an intelligence could hardly regard it even as *possible* that the universe should be one, or that reality was a whole, or that a universe or whole existed at all. For the crude data, as presented, would not look to it like a whole at all, but would seem symptomatic rather of an infinite chaos. And it would have no motive for looking beneath the surface of "appearances." It would not make the distinction between "reality" and "appearance" at all, but

\* I am here paraphrasing what strikes me as the ablest defence of the notion of wholeness up to date, in Professor Hoernlé's *Studies in Contemporary Metaphysics*, esp. pp. 17-19.

would accept everything in good faith as it came along. The job of really unifying the given into a cosmos, suppressing nothing, rejecting nothing, preferring nothing, would seem to it as unmeaning and impossible as finding the centre of Space or bisecting Time. Yet it is clear that these problems would present no difficulty for any one who is willing to answer, "Here and Now!" But it is equally clear that, as everything has its own Here-and-Now (as even physics has now to recognize in the Principle of Relativity), this answer only enhances the difficulty of really unifying the real.

(4) But even if, for argument's sake, the universe is granted to exist, what about the *proof* of its existence? Can a coercive demonstration of its existence be devised? *Chi lo sa?* All one can say is that so far the proofs which are offered of the contention that the real is compacted into a universe are quite inadequate. They appear to be merely crude forms of what Kant called the "ontological proof" of the existence of God, but should more properly be called the *verbalist* inference from "idea" to fact, seeing that it takes the existence of a word as evidence enough for the existence of a thing to correspond.

To examine the value of this procedure by the case of "the universe" has, however, some advantages. For the case of "God" is complicated by the enormous ambiguity of the term, and by the amount of emotional "dazzle-painting" which has coloured it. "The universe" has not much emotional value, even for philosophers, and so it is much easier to follow the merely logical course of the ontological "proof." It appears to reason thus:

We have found reality such as to suggest to us the notion of a "universe." This notion we have adopted, developed, and adorned with wondrous attributes, which go far beyond our empirical data. We have, however, considerable success in applying the notion of "universe" to our experience. For we know in advance that *some* of its attributes must be true of reality, seeing that it was in reality that we found them when

we were building up our notion of "universe." What we really want to infer from it is the *other* attributes, which are metaphysically important. Do *these* coexist with the former in reality, as they do in our idea? They are not to be found *empirically*, but if the notion of "universe" is true (*as a whole*), it will guarantee their existence. We argue, therefore, that because the notion of "universe" is *partially* true it is *wholly* true. Is this sound? We can certainly *hope* so. We can even *postulate* it. But can we say it is *proved*? And proved coercively? It is certainly not formally valid, and *jumps* to a conclusion that carries it far beyond its premisses.

It hardly seems conceivable that any logic which retains a lingering regard for form and for the distinctions between ideal and real, fiction and fact, desire and fulfilment, postulation and validation, should confidently answer these questions in the affirmative. The "ontological proof" *may be* the only means of upholding certain ideals *a priori*, but the only evidence it adduces for the existence of its object is the fact that we have coined a *word* for the postulated satisfaction of our craving.

## VI.

What is the moral of this prolonged foray into the field of dialectics? Surely this, that if we no longer content ourselves with the old Aristotelian form of logic, as being a good intellectual *game*, and as an adequate analysis of the *verbal* implications of propositions and "dictionary-meanings," and require logic to become relevant to real thought and reasoning and to the methods by which the real is known, we must be prepared to go the whole hog, and to abandon the vain attempt to determine the meaning of reasoning by mere rumination on the words by which it was conveyed, and in abstraction alike from those who used them and those to whom they were addressed. Now formal logic had considerable merits. It was clear, though narrow in its outlook. It did

not completely state and justify all its presuppositions,\* but at least it formed a real system, and attained a high degree of coherence. Such coherence is conspicuously lacking to the semi-informal compromises which substitute "implication" for "formal validity," and when "cornered," shamefacedly and spasmodically appeal from words to "meanings," from "form" to fact, from fact to "value," from premisses to "consequences," from "necessity" to choice, from compulsion to "satisfaction," from exhaustion to "relevance," from wholeness to "selection," from "absoluteness" to relativity to purpose, and imagine that they can turn tabooed "psychology" into respectable "logic" by pretending to depersonalize the really operative forces in our thinking. The obscurity, elusiveness and ambiguity of their answers are such as to leave open vital questions, such as whether Logic is, in their opinion, normative or descriptive, and if either, of what; whether "implication" is formal, or material, or both, or neither; whether, and how far, the notion of "formal validity" is to be retained or replaced by that of (progressive) *value*, and the notion of absolute certainty by that of "approximation" and probability. In short the whole question of the meaning, function, method and value of Logic is left involved in an impenetrable fog. Unfortunately the insufficiency of the shelter afforded by these half-way houses cannot be set forth in full detail on this occasion: I can only, in conclusion, register a claim to have, by the palmary instance of the logical "system" and the logical "circle," added to the proof that the notion of "formal validity" is an unfortunate illusion.

\* Cf. Dr. Singer's *Studies in the History and Method of Science*, 1917, pp. 240-51.

appearances be not existents, is it not, following a line of reasoning which he himself adopts, at least *possible* that all are not?

If the argument (c) be valid, it can, I should suppose, hardly be disputed that a cognitive act must have a specific "content," or character, of its own. The conception that blue is a constituent or part of the awareness of blue, or that what is attended to is a constituent or part of the attending, is, I confess, a conception to which I can attach no definite meaning. I should have thought that even if a complex of non-mental terms and relations gives rise, as Professor Broad suggests, to the property of being mental, yet still the relation of this "property" to its objects would *not* be the relation of whole to parts. And when Dr. Moore contends that there is "absolutely no reason to believe in the existence" of a cognitive act's content, I should reply that there is, in the first place, the same kind of reason which he gives for believing in the existence of the entities which he takes to be cognized in perception,—namely, that, if we attend carefully enough to the facts, it is possible to discover that what we mean by the awareness of  $x$  is not something of which  $x$  itself is a constituent, however true it may be, and is, that  $x$  is related to the awareness. But I should urge, in the second place, that the psychological facts of association, assimilation, retentiveness, memory, and imagination, to say nothing of the considerations which James emphasises in his chapter on *The Stream of Thought*, supply reasons in abundance for the view which Dr. Moore would so summarily dismiss.

Professor Broad allows that if the phrase "cognitive act" be just a general name for seeings, hearings, smellings, remembering, etc., there can be no question as to the existence of "cognitive acts." He thinks, however, that most people would call these admitted entities "cognitions," and would hold that to call them "acts" is to go further. But would they? It would seem, at any rate, a curious perversity of

**January 17th, 1921.** Very Rev. W. R. Inge, President, in the Chair.—Prof. G. Dawes Hicks opened the second discussion on "Space, Time, and Deity." Mr. Constable, Mr. Hooper, Prof. Carr, Miss Sinclair, Mr. Ginsberg, Prof. Boodin, Miss Oakeley, and Prof. Jeffery, took part.

**February 7th, 1921.** Rt. Hon. Viscount Haldane, Vice-President, in the Chair.—Prof. R. F. A. Hoernlé read a paper on "A Plea for a Phenomenology of Meaning." A discussion followed, in which Prof. Wildon Carr, Prof. Whitehead, Dr. Wolf, Prof. Boodin, Mr. Mead, Dr. Goldsbrough, Mr. Cator, and Lord Haldane, took part. Prof. Hoernlé replied.

**February 21st, 1921.** Very Rev. W. R. Inge, President, in the Chair.—Miss Oakeley opened the third discussion on "Space, Time, and Deity." The concept of Deity was the special subject of her criticism. The following members took part: Prof. Nunn, Mr. Constable, Prof. Carr, Mr. Ginsberg, Mr. Hooper, Mr. Mead, Prof. Whitehead, Miss Sinclair, Prof. Boodin, Dr. Relton, Miss Hazlitt, Mr. Cator.

**March 7th, 1921.** Prof. A. N. Whitehead in the Chair.—Prof. J. E. Boodin read a paper on "Cosmic Evolution." The Chairman opened the discussion, followed by Prof. Carr, Mr. Shand, Prof. Nunn, Dr. Gates, Miss Sinclair, Miss Edgell, Mr. Ainslie, Mr. Shaw-Stewart, Miss Oakeley, Mr. Mead, and Dr. Wolf. Prof. Boodin replied.

**April 4th, 1921.** Prof. G. Dawes Hicks, Vice-President, in the Chair.—A symposium "On the Character of Cognitive Acts," by Prof. J. Laird, Dr. G. E. Moore, Prof. C. D. Broad, and Prof. G. Dawes Hicks, was discussed. Each of the contributors summarized his own arguments and replied to the criticisms of the others. In the general discussion Prof. Nunn, Mr. Joel, Miss Sinclair, and Mr. Das Gupta took part.

**May 2nd, 1921.** Prof. H. Wildon Carr, Vice-President, in the Chair. Miss H. D. Oakeley read a paper on "Prof. Driesch's attempts to combine a Philosophy of Life and a Philosophy of Knowledge." The Chairman opened the discussion, and was followed by Dr. Goldsbrough, Dr. Ruggles Gates, Prof. Piper, Mr. Mead, Prof. Nunn, Mr. Ainslie, Prof. Brough, and Dr. Jessie White. Miss Oakeley replied.

May 23rd, 1921. Very Rev. W. R. Inge, President, in the Chair.—Dr. Hastings Rashdall read a paper on Dr. Inge's "The Idea of Progress." The President replied, and a general discussion followed, in which the following members took part: Prof. Nunn, Prof. Carr, Mr. Ainslie, Dr. Tudor Jones, Miss Sinclair, Mr. Joad, Miss Oakeley, Miss Stebbing, Mr. Ginsberg, Prof. Whitehead. Dr. Rashdall and Dr. Inge replied.

June 6th, 1921. Prof. G. Dawes Hicks, Vice-President, in the Chair.—Miss Dorothy Wrinch read a paper "On the Structure of Scientific Inquiry." The following members and visitors took part in the discussion:—Mr. Fox Pitt, Prof. Nunn, Mr. Hannay, Prof. J. W. Nicholson, Dr. H. Jeffreys, Major McMahon, Prof. Carr, Prof. Brough, Mr. Brierley, Prof. Gates, and Mr. Cator. Dr. Wrinch replied.

July 4th, 1921. Prof. G. Dawes Hicks, Vice-President, in the Chair.—The Hon. Secretary read the Report of the "Executive Committee for the Forty-second Session," and the Treasurer presented the Financial Statement, audited by Dr. Goldsbrough and Mr. Mead. The Report and Statement were adopted. The following nominations by the Executive Committee of the Officers for the next Session were approved:—President, Dr. F. C. S. Schiller; Honorary Treasurer, Prof. T. Percy Nunn; Librarian, Miss L. S. Stebbing; Honorary Secretary and Editor, Prof. H. Wildon Carr. Dr. G. F. Goldsbrough and Mr. G. R. S. Mead were appointed auditors. As a result of the ballot the following members were elected to the Executive Committee: Mr. Morris Ginsberg, Prof. G. Dawes Hicks, Mr. C. E. M. Joad, Miss M. MacFarlane, Miss Hilda D. Oakeley, Dr. F. W. Thomas. Dr. F. C. S. Schiller read a paper on "Arguing in a Circle." A discussion followed, in which the Chairman, Prof. Nunn, Mr. Constable, Prof. Carr, Mr. Joad, Mr. Matthews, Dr. Thomas, Miss Stebbing, Mr. Cator, Mr. Ginsberg, and Mr. Ainslie took part. Dr. Schiller replied.



# LIST OF OFFICERS AND MEMBERS FOR THE FORTY-THIRD SESSION, 1921-1922.

## THE COUNCIL.

### PRESIDENT.

F. C. S. SCHILLER, M.A., D.Sc.

### VICE-PRESIDENTS.

BERNARD BOSANQUET, M.A., LL.D., F.B.A. (President, 1894-1898).

G. F. STOUT, M.A., LL.D., F.B.A. (President, 1899-1904).

VERY REV. DEAN HASTINGS RASHDALE, M.A., D.C.L., F.B.A. (President, 1904-1907).

RIGHT HON. VISCOUNT HALDANE OF CLOAN, O.M., K.T. LL.D., F.R.S., F.B.A. (President, 1907-1908).

S. ALEXANDER, M.A., LL.D., F.B.A. (President, 1908-1911).

HON. BERTRAND RUSSELL, M.A., F.R.S. (President, 1911-1913).

G. DAWES HICKS, M.A., Ph.D., Litt.D. (President, 1913-1914).

RIGHT HON. ARTHUR J. BALFOUR, M.P., LL.D., F.R.S. (President, 1914-1915).

H. WILDON CARR, D.Litt. (President, 1915-1918).

G. E. MOORE, Sc.D., LL.D., F.B.A. (President, 1918-1919).

JAMES WARD, Sc.D., LL.D., F.B.A. (President, 1919-1920).

VERY REV. W. R. INGE, D.D. (President, 1920-1921).

### VICE-CHAIRMAN.

PROF. G. DAWES HICKS.

### TREASURER.

PROF. T. PERCY NUNN.

London Day Training College, Southampton Row, W.C.1

### LIBRARIAN.

MISS L. S. STEBBING.

27, Bel-size Park, N.W. 3.

### HONORARY SECRETARY.

PROF. H. WILDON CARR.

107, Church Street, Chelsea, S.W. 3.

### EXECUTIVE COMMITTEE.

MR. MORRIS GINSBERG.

PROF. G. DAWES HICKS.

MR. C. E. M. JOAD.

MISS M. MACFARLANE.

MISS HILDA D. OAKELEY.

DR. F. W. THOMAS.

## HONORARY MEMBERS.

- F. H. BRADLEY, M.A., LL.D., Merton College, Oxford.  
 Prof. W. R. DUNSTAN, M.A., LL.D., F.R.S., 38, Cranley Gardens, S.W.  
 Prof. Sir HENRY JONES, M.A., LL.D., Litt.D., F.B.A., The University,  
 Glasgow.  
 Prof. JAMES WARD, Sc.D., LL.D., D.Sc., F.B.A., 6, Selwyn Gardens,  
 Cambridge.

## CORRESPONDING MEMBERS.

- Prof. J. MARK BALDWIN, c/o Harris Forbes & Co., 56, William Street,  
 New York.  
 Prof. HENRI BERGSON, 32, Rue Vital, Paris.  
 Prof. ÉMILE BOUTROUX, 5, Rond-Point Bugenot, Paris.  
 Prof. J. M. CATTELL, Garrison, New York.  
 Senator BENEDETTO CROCE, Trinità Maggiore 12, Naples.  
 Prof. JOHN DEWEY, Columbia University, New York City.  
 M. H. DZIEWICKI, 11, Szczępańska, Cracow, Poland.  
 Prof. HARALD HÖFFDING, Carlsberg, Copenhagen.  
 Prof. E. B. TITCHENER, Cornell University, Ithaca, New York.

## MEMBERS.

Elected.

1915. DOUGLAS AINSLIE, B.A., Athenæum Club, S.W. 1.  
 1885. Prof. S. ALEXANDER, M.A., LL.D., F.B.A., *Vice-President*, 24, Brunswick Road, Withington, Manchester.  
 1919. G. ANDERSON, M.A., 552, Lonsdale Street, Melbourne.  
 1913. Rev. FRANCIS W. AVELING, D.D., Ph.D., University College, Gower Street, W.C. 1.  
 1916. Prof. J. B. BAILLIE, M.A., D.Phil., Aberdeen.  
 1908. Right Hon. ARTHUR J. BALFOUR, M.P., LL.D., F.R.S., *Vice-President*, 4, Carlton Gardens, Pall Mall, S.W. 1.  
 1912. Prof. SURENDRA NATH BHAR, M.A., Gaurisankar-Sater Lille-Elvedalen, Norway.  
 1915. Miss B. C. BARFIELD, Bicknell, Athenæum Road, Whetstone, N. 20.  
 1915. F. C. BARTLETT, B.A., 32, St. Barnabas Road, Cambridge.  
 1919. ROBERT J. BARTLETT, 12, Belsize Crescent, N.W. 3.  
 1907. Mrs. MARGHERITA BEER, M.A., 65, College Court, Hammersmith, W.  
 1893. E. C. BENECKE, 182, Denmark Hill, S.E. 5.  
 1913. Col. E. H. BETHELL, 18, Hyde Park Square, W. 2.  
 1888. H. W. BLUNT, M.A., 183, Woodstock Road, Oxford.  
 1913. Prof. A. BONUCCI, Perugia.  
 1921. Prof. J. E. BOODIN, M.A., Ph.D., Carleton College, Minnesota, U.S.A.  
 1886. Prof. BERNARD BOSANQUET, M.A., LL.D., D.C.L., F.B.A., *Vice-President*, The Heath Cottage, Oxshott, Surrey.  
 1890. A. BOUTWOOD, Charity Commission, Whitehall, S.W. 1.  
 1919. W. R. V. BRADY, B.A., 34, Kingsmead Road,ulse Hill, S.W. 2.  
 1919. Rev. W. O. BRIGSTOCKE, B.A., Royal Societies Club, St. James's, S.W. 1.

## Elected.

1914. Prof. C. D. BROAD, M.A., D.Lit., The University, Bristol.  
 1889. Prof. J. BROUGH, LL.D., Hampden Club, N.W. 1.  
 1917. Miss ELSIE M. BRYANT, B.A., Mayfield Hostel, Arbroath Road, Dundee.  
 1919. J. BUTLER BURKE, M.A., Royal Societies Club, St. James's Street, S.W. 1.  
 1921. L. D. BURLING, 47, Parliament Street, S.W. 1.  
 1913. C. DELISLE BURNS, M.A., 3, Kents Grove, Hampstead, N.W. 3.  
 1921. E. H. BUTT, M.A., Lower School of John Lyon, Harrow.
1906. Rev. Preb. A. CALDECOTT, M.A., D.D., D.Lit., Great Oakley Rectory, Harwich.  
 1920. Prof. MARY WHITON CALKINS, Wellesley College, Wellesley, Mass., U.S.A.  
 1918. Prof. E. T. CAMPAGNAC, M.A., Greengate, Dingle Lane, Liverpool.  
 1881. Prof. H. WILDON CARR, D.Litt., *Vice-President and Hon. Sec.*, 107, Church Street, Chelsea, S.W. 3.  
 1918. GERALD CATOR, 67, Castleton Mansions, S.W. 13.  
 1918. Prof. G. C. CHATTERJI, B.A., Central Training College, Lahore, India.  
 1906. E. C. CHILDS, M.A., 68, North View, Westbury Park, Bristol.  
 1918. Miss M. E. CLARKE, M.A., 52, Lower Sloane Street, S.W. 1.  
 1920. Miss H. CLERGE, Albemarle Club, 37, Dover Street, W. 1.  
 1912. Prof. ALBERT A. COCK, B.A., University College, Southampton.  
 1907. F. J. O. CODDINGTON, M.A., LL.M., 42, Bank Street, Sheffield.  
 1895. STANTON COIT, Ph.D., 30, Hyde Park Gate, S.W. 7.  
 1913. G. D. H. COLE, M.A., 13, Bramerton Street, Chelsea, S.W. 3.  
 1920. F. C. CONSTABLE, M.A., Grenville, Lansdown, Bath.  
 1920. F. C. COULTER, M.A., Royal Societies Club, St. James's Street, S.W. 1.  
 1921. Mrs. P. M. CROTHWAITE, Highfield, King's Langley.
1917. Right Rev. C. F. D'ARCY, D.D., Archbishop of Armagh, Primate of Ireland, The Palace, Armagh.  
 1912. Prof. WILLIAM L. DAVIDSON, M.A., LL.D., 8, Queen's Gardens, Aberdeen.  
 1916. Rev. A. E. DAVIES, M.A., 48, Blenheim Gardens, Cricklewood, N.W. 2.  
 1921. Mrs. DE LA FELD, 1, Carlos Place, Grosvenor Square, W. 1.  
 1896. E. T. DIXON, M.A., Billy Dun, Half-Way Tree, Jamaica.  
 1912. Miss L. DOUGALL, Cutts End, Cumnor, Oxford.  
 1918. Rev. JOHN DRAKE, M.A., B.D., 19, Furnival Street, E.C. 4.  
 1918. JAMES DREVER, M.A., B.Sc., D.Phil., Roselen, Gullane, East Lothian.  
 1899. J. A. J. DREWITT, M.A., Wadham College, Oxford.  
 1911. Mrs. N. A. DUDINGTON, M.A., 13, Carlton Terrace, Child's Hill, N.W. 2.
1910. Miss BEATRICE EDGELL, M.A., Ph.D., 15, Lyon Road, Harrow.  
 1917. Rev. A. E. ELDER, 1, Oakfield Villas, Cobham, Surrey.  
 1921. GILBERT ELLIOT, M.A., 87, Victoria Street, S.W. 1.

## Elected.

1919. Prof. J. H. FARLEY, Laurence College, Appleton, Wisconsin, U.S.A.  
 1914. ERIC FARMER, M.A., Royal Societies Club, St. James's Street, S.W. 1.  
 1920. Prof. A. S. FERGUSON, Queen's University, Kingston, Ontario.  
 1912. G. C. FIELD, M.A., D.Sc., The University, Liverpool.  
 1914. Miss MARY FLETCHER, 13, Ladbroke Terrace, W. 11.  
 1920. Miss I. FLINN, Ormond College, Melbourne.  
 1919. Mrs. FORMAN, 18, Drayton Gardens, S.W. 10.  
 1920. Sir JAMES G. FRAZER, D.C.L., D.Litt., F.B.A., 1, Brick Court, Temple, E.C. 4.  
 1918. Miss MIDGE FULLER, 69, Lansdowne Road, W. 11.
1914. Miss MARJORIE GABAIN, The Manor House, Bushey, Herts.  
 1919. E. GARCKE, Ditton House, near Maidenhead.  
 1916. Miss H. GAVIN, 27, Belsize Park, N.W. 3.  
 1919. Rev. W. F. GRIKIE-COBB, D.D., 40, Cathcart Road, S.W. 10.  
 1897. Prof. W. R. BOYCE GIBSON, M.A., Lichfield, Wallace Avenue, Torrak, Melbourne.  
 1918. Mrs. MARY H. GIBSON-SMITH, Ph.D., 13, Fox Hills, Selly Oak, Birmingham.  
 1911. Prof. C. M. GILLESPIE, M.A., The University, Leeds.  
 1913. MORRIS GINSBERG, M.A., Teacher's Guild Club, 9, Brunswick Square, W.C. 1.  
 1900. G. F. GOLDSBROUGH, M.D., 125, Herne Hill, S.E. 21.  
 1912. Prof. FRANK GRANGER, D.Litt., 37, Lucknow Drive, Nottingham.  
 1920. THOMAS GREENWOOD, L. es L., 45, Gresham Road, S.W. 9.  
 1918. ALBERT GRESSWELL, M.A., M.D., Louth, Lincolnshire.  
 1921. J. Y. T. GREIG, M.A., Armstrong College, Newcastle-on-Tyne.  
 1921. Prof. DANIEL GRIFFITHS, Granville House, Pontypool, Mon.  
 1920. S. W. DAS GUPTA, 47, Jesus Lane, Cambridge.
1920. M. A. HAFEEZ, M.A., 9/2, Kyd Street, Calcutta.  
 1912. J. C. HAGUE, M.A., London Day Training College, Southampton Row, W.C. 1.  
 1883. Right Hon. Viscount HALDANE OF CLOAN, O.M., K.T., LL.D., F.R.S., F.B.A., *Vice-President*, 28, Queen Anne's Gate, S.W. 1.  
 1917. J. S. HALDANE, M.A., LL.D., F.R.S., Cherwell, Oxford.  
 1915. Miss S. ELIZABETH HALL, 6, Prince Arthur Road, N.W. 3.  
 1920. Miss M. HAMMOND, The University, Birmingham.  
 1920. THOMAS W. HAND, The Librarian, Public Library, Leeds.  
 1920. A. H. HANNAY, B.A., 28, Thurlow Road, Hampstead, N.W. 3.  
 1919. Rev. R. HANSON, M.A., B.D., 30, Holroyd Road, Putney, S.W. 15.  
 1913. R. P. HARDIE, M.A., 13, Palmerston Road, Edinburgh.  
 1919. Mrs. E. THURLOW HARRISON, 3, Devonshire Terrace, Hyde Park, W. 2.  
 1918. Miss VICTORIA HAZLITT, M.A., Bedford College, N.W. 1.  
 1918. A. E. HEATH, M.A., 22, Abercromby Square, Liverpool.  
 1915. Principal H. J. W. HETHERINGTON, M.A., University College, Exeter.  
 1890. Prof. G. DAWES HICKS, M.A., Ph.D., Litt.D., *Vice-Chairman*, 9, Cranmer Road, Cambridge.

## Elected.

1919. REV. EDWARD W. HIRST, Lynton Villa, The Firs, Bowdon, Cheshire.  
 1912. PROF. R. F. A. HOERNLÉ, M.A., B.Sc., Armstrong College, Newcastle-on-Tyne.  
 1918. MICHEL G. HOLBAN, Rhodesia Court, 29, Harrington Gardens, S.W.  
 1916. S. E. HOOPER, M.A., The Rectory, East Horsley, Surrey.  
 1921. MISS A. A. HORNE, 119, Ebury Street, S.W. 1.
1916. VERY REV. DEAN W. R. INGE, D.D., *Vice-President*, The Deanery, St. Paul's, E.C. 4.  
 1913. ALEXANDER C. IONIDES, jun., 31, Porchester Terrace, W. 2.  
 1919. N. ISAACS, 61, Leigh Road, Highbury, N. 5.
1911. PRINCIPAL L. P. JACKS, M.A., LL.D., D.D., Shotover Edge, Headington, Oxford.  
 1918. REV. J. G. JAMES, M.A., D.Lit., Brynhyfryd, Andover Road, Southsea.  
 1904. PRINCIPAL F. B. JEVONS, M.A., D.Litt., Bishop Hatfield's Hall, Durham.  
 1915. C. E. M. JOAD, M.A., 2, Squires Mount, Hampstead, N.W. 3.  
 1918. C. B. JOHNSON, M.A., 2, King's Bench Walk, E.C. 4.  
 1919. PROF. JAMES JOHNSTONE, D.Sc., The University, Liverpool.  
 1920. R. F. JOHNSTON, M.A., The Forbidden City, Pekin.  
 1892. MISS E. E. CONSTANCE JONES, D.Litt., Meldon House, Weston-super-Mare, Somerset.
1911. REV. TUDOR JONES, M.A., Ph.D., 14, Clifton Park, Bristol.  
 1912. MISS E. F. JOURDAIN, D. ès L., St. Hugh's College, Oxford.
1912. J. N. KEYNES, D.Sc., 6, Harvey Road, Cambridge.
1916. PROF. J. LAIRD, M.A., 4, Cranmore Gardens, Belfast, Ireland.  
 1881. A. F. LAKE, Wrangaton, Sundridge Avenue, Bromley.  
 1911. PROF. GEO. H. LANGLEY, M.A., Dacca, Bengal, I. lin.  
 1898. PROF. ROBERT LATTI, M.A., D.Phil., The University, Glasgow.  
 1921. JOHN ARTHUR LAW, 29, Southampton Buildings, W.C. 2.  
 1919. S. C. LAZARUS, B.A., The University, Melbourne.  
 1915. MISS MARJORIE LEBUS, B.A., 11, Netherhall Gardens, N.W. 3.  
 1918. CAPTAIN A. E. I. LEGGE, Kingsmead, Winkfield, Windsor.  
 1908. A. D. LINDSAY, M.A., 2, Fyfield Road, Oxford.  
 1897. REV. JAMES LINDSAY, M.A., B.Sc., D.D., Annick Lodge, by Irvine, Ayrshire.
1912. PROF. THOMAS LOVEDAY, M.A., University College, Southampton.  
 1920. REV. A. A. LUCE, Trinity College, Dublin.  
 1909. ARTHUR LYNCH, M.A., 80, Antrim Mansions, Haverstock Hill, N.W. 3.
1911. PROF. WM. MACDUGALL, M.A., D.Sc., F.R.S., Harvard University, Cambridge, Mass.  
 1916. C. A. MACK, B.A., Ivy Lodge, Dereham Road, Norwich.  
 1912. PROF. R. M. McIVER, M.A., The University, Toronto.  
 1918. MISS E. M. MACKAY, Skucritten House, Oban, Scotland.

## Elected.

1916. Prof. J. S. MACKENZIE, Litt.D., 56, Bassett Road, North Kensington, S.W. 10.
1910. Sir W. LESLIE MACKENZIE, M.A., M.D., 4, Clarendon Crescent, Edinburgh.
1918. Prof. A. MAIR, M.A., 26, Parkfield Road, Princes Park, Liverpool.
1917. ABDUL MAJID, B.A., P.O. Daryabad, Oudh, India.
1919. Miss JESSIE A. MALLETT, 29, Launceston Place, W. 8.
1919. B. K. MALLIK, B.A., 22, Farndon Road, Oxford.
1916. Rev. W. R. MATTHEWS, M.A., B.D., King's College, Strand, W.C. 2.
1918. Miss MARGARET MCFARLANE, B.A., 50, Southwood Lane, Highgate.
1918. Rev. WM. MONTGOMERY MCGOVERN, Ph.D., School of Oriental Studies, Finsbury Circus, E.C. 2.
1899. J. LEWIS MCINTYRE, D.Sc., Abbotsville, Cults, N.B.
1914. G. R. S. MEAD, B.A., 47, Campden Hill Road, W. 8.
1912. Rev. S. H. MELLONE, M.A., D.Sc., 44, Ridgeway, Golders Green, N.W. 11.
1920. E. MILLER, M.A., 33, Oxford Mansions, Oxford Circus, W. 1.
1915. P. CHALMERS MITCHELL, M.A., D.Sc., LL.D., F.R.S., Zoological Society, Regent's Park, N.W. 8.
1889. R. E. MITCHESON, M.A., Charity Commission, Whitehall, S.W. 1.
1919. Rev. WILFRED MOOR, B.A., Ph.D., St. John's Seminary, Woking, Guildford, Surrey.
1896. G. E. MOORE, Sc.D., LL.D., F.B.A., *Vice-President*, 17, Magdalene Street, Cambridge.
1915. Mrs. G. E. MOORE, 17, Magdalene Street, Cambridge.
1910. Prof. C. LLOYD MORGAN, LL.D., F.R.S., 5, Victoria Square, Clifton, Bristol.
1912. DAVID MORRISON, M.A., The University, St. Andrews, Scotland.
1918. K. C. MUCKERJEE, B.A., Jesus College, Oxford.
1913. J. MURRAY, M.A., Christ Church, Oxford.
1912. C. S. MYERS, M.D., Sc.D., F.R.S., 30, Montagu Square, W. 1.
1904. Prof. T. PERCY NUNN, M.A., D.Sc., *Treasurer*, London Day Training College, Southampton Row, W.C. 1.
1908. Miss HILDA D. OAKELEY, M.A., 97, Warwick Road, Earl's Court, S.W. 5.
1918. Captain HERBERT J. PAGE, 97, Cadogan Gardens, S.W. 3.
1918. Mrs. HERBERT J. PAGE, 97, Cadogan Gardens, S.W. 3.
1919. HERBERT J. PATON, M.A., Queen's College, Oxford.
1903. Miss E. A. PEARSON, Moxhams, Bradford-on-Avon.
1916. W. A. PICKARD-CAMBRIDGE, M.A., Worcester College, Oxford.
1917. Hon. ELEANOR M. PLUMER, M.A., Mary Ward Settlement, Tavistock Place, W.C. 1.
1913. Prof. A. S. PRINGLE-PATTISON, LL.D., D.C.L., F.B.A., 16, Church Hill, Edinburgh.
1916. Miss M. PUNNETT, B.A., London Day Training College, Southampton Row, W.C. 1.

## Elected.

1914. ADAM RANKINÉ, Newstead, Monkham's Avenue, Woodford Green, Essex.
1889. Very Rev. Dean HASTINGS RASHDALL, M.A., D.C.L., F.B.A., *Vice-President*, The Deanery, Carlisle.
1918. Rev. H. MAURICE RELTON, D.D., The Vicarage, Isleworth.
1918. C. A. RICHARDSON, B.A., 25, Victoria Square, Jesmond, Newcastle-on-Tyne.
1918. GEORGE PITT-RIVERS, Hinton St. Mary, Dorset.
1920. Mrs. URSULA ROBERTS, 19, Woburn Square, W.C. 1.
1896. Prof. ARTHUR ROBINSON, M.A., D.C.L., Observatory House, Durham.
1920. Miss VERA A. ROSENBLUM, M.A., The University, Melbourne.
1919. Mrs. MARGARET ROSS, Grays House, Wellgarth Road, Humpstead, N.W. 3.
1908. Prof. G. R. T. ROSS, D.Phil., Rangoon College, Burma.
1921. LEON ROTH, M.A., Exeter College, Oxford.
1919. Miss E. M. ROWELL, M.A., Royal Holloway College, Englefield Green, Surrey.
1912. Prof. SATIS CHANDRA ROY, B.A., Dyal Singh College, Lahore, Punjab, India.
1896. Hon. BERTRAND RUSSELL, M.A., F.R.S., *Vice-President*, 70, Overstrand Mansions, Battersea.
1905. F. C. S. SCHILLER, M.A., D.Sc., *President*, Corpus Christi College, Oxford.
1912. Prof. J. W. SCOTT, M.A., D.Phil., University College, Cardiff.
1918. W. E. G. SERUYI, M.A., Anibok Chambers, Cape Coast, Gold Coast, West Africa.
1892. ALEXANDER F. SHAND, M.A., 1, Edwardes Place, Kensington, W. 8.
1917. G. BERNARD SHAW, 10, Adelphi Terrace, W.C. 2.
1917. Mrs. BERNARD SHAW, 10, Adelphi Terrace, W.C. 2.
1901. A. T. SHEARMAN, M.A., D.Lit., University College, Gower Street, W.C. 1.
1911. H. S. SHELTON, B.Sc., 151, Richmond Road, Twickenham.
1920. Prof. CONRAD ALFRED SCHIRMER, 1146, Reaney Street, St. Paul, Minn., U.S.A.
1910. Miss F. ROSAMOND SHIELDS, M.A., St. Margaret's House, Bethnal Green, E. 2.
1919. LUDWIG SILBERSTEIN, Ph.D., The College, Rochester, New York.
1917. Miss MAY SINCLAIR, 1, Blenheim Road, St. John's Wood, N.W. 8.
1907. W. G. SLEIGHT, M.A., D.Litt., 16, Eardley Road, Streatham, S.W. 16.
1919. HENRY H. SLESSER, 11, King's Bench Walk, Temple, E.C. 4.
1908. Prof. J. A. SMITH, M.A., Magdalen College, Oxford.
1917. Prof. NORMAN K. SMITH, D.Phil., LL.D., The University, Edinburgh.
1920. Rev. T. J. SMITH, The University, Melbourne.
1916. E. SHARWOOD SMITH, M.A., The Grammar School, Newbury, Berks.
1886. Prof. W. R. SORLEY, M.A., Litt.D., LL.D., F.B.A., St. Giles, Chesterton Lane, Cambridge.
1908. K. J. SPALDING, M.A., Stoneways, High Wycombe.

## Elected.

1908. Miss H. M. SPANTON, 1, The Paragon, Blackheath, S.E. 3.  
 1911. Prof. CAROLINE F. E. SPURGEON, D. & L., 19, Clarence Gate Gardens, N.W. 1.  
 1910. Miss L. S. STEBBING, M.A., *Librarian*, 27, Belsize Park, N.W. 3.  
 1912. Mrs. ADRIAN STEPHEN, 50, Gordon Square, W.C. 1.  
 1919. J. MCKELLAR STEWART, B.A., D.Phil., The University, Melbourne.  
 1918. Rev. C. R. SHAW STEWART, M.A., 6, Queen's Elm Square, S.W. 3.  
 1887. Prof. G. F. STOUT, M.A., LL.D., F.B.A., *Vice-President*, Craigard, St. Andrews, Scotland.  
 1918. Mrs. ALIX STRACHEY, 41, Gordon Square, W.C. 1.  
 1915. OLIVER STRACHEY, 96, South Hill Park, Hampstead Heath, N.W. 3.  
 1912. E. H. STRANGE, M.A., 25, Leicester Road, Wanstead, E. 11.  
 1915. Prof. KOJIRO SUGIMORI, University of Waseda, Tokyo, Japan.  
 1910. W. K. TANNER, M.A., Fordlyne, Winscombe, Somerset.  
 1904. F. TAVANI, 92, Loughborough Road, S.W. 9.  
 1908. Prof. A. E. TAYLOR, M.A., D.Litt., F.B.A., 9, Dempster Terrace, St. Andrews, N.B.  
 1915. F. W. THOMAS, M.A., Ph.D., The Library, India Office, S.W. 1.  
 1919. Rev. Prof. W. H. THOMPSON, LL.D., St. Stephen's Vicarage, West Ealing, W. 13.  
 1917. J. M. THORBURN, University College, Cardiff.  
 1916. ALGAR L. THOROLD, M.A., Savile Club, 107, Piccadilly, W. 1.  
  
 1917. W. E. URWICK, M.A., 5, Wildwood Road, Golders Green, N.W. 4.  
  
 1919. EUGENE VIRPSHA, 73, Lexham Gardens, W. 8.  
 1918. Miss F. VOISIN, B.A., 3, Wymering Mansions, W. 9.  
  
 1918. Miss MARION E. WAKEFIELD, M.A., 58, Belsize Park Gardens, Hampstead, N.W. 3.  
 1920. Rev. LESLIE J. WALKER, M.A., Campion Hill, Oxford.  
 1902. JOSEPH WALKER, M.A., Wooldale, Thongsbridge, Huddersfield.  
 1908. SYDNEY P. WATERLOW, M.A., Parsonage House, Oure, Pewsey, Wilts.  
 1919. FRANK WATTS, M.A., The University, Manchester.  
 1890. Prof. CLEMENT C. J. WEBB, M.A., Holywell Ford, Oxford.  
 1896. Prof. R. M. WENLEY, M.A., D.Phil., D.Sc., Litt.D., LL.D., 509, East Madison Street, Ann Arbor, Mich., U.S.A.  
 1907. Mrs. JESSIE WHITE, D.Sc., 49, Gordon Mansions, W.C. 1.  
 1915. Prof. A. N. WHITEHEAD, D.Sc., LL.D., F.R.S., 259A, King's Road, Chelsea, S.W. 3.  
 1919. T. NORTH WHITEHEAD, B.A., 14, Carlyle Square, S.W. 3.  
 1919. Miss A. L. S. WISE, 16, West Kensington Gardens, W. 14.  
 1900. A. WOLF, M.A., D.Lit., 12, Kewferry Road, Northwood, Middlesex.  
 1919. Rev. A. WOOD, D.D., St. John's Seminary, Womersley, Guildford.  
 1920. Miss CHARLOTTE WOODS, 13, Cowley Street, Westminster, S.W. 1.  
 1911. ARTHUR WORSLEY, Mandeville House, Isleworth.



Elected.

1918. Miss E. M. WORTHINGTON, 75, West Cromwell Road, S.W. 5.

1917. Miss DOROTHY WRINCH, D.Sc., Girton College, Cambridge.

1916. Miss L. K. YOUNG, B.A., Oaklea, Silverhill, St. Leonards-on-Sea.

1910. Sir FRANCIS YOUNGHUSBAND, Litt.D., 3, Buckingham Gate, S.W. 1.

1918. Mrs. ZARCHI, B.A., 75, Clifton Hill, N.W. 8.

#### LIBRARIES.

ARMSTRONG COLLEGE, Newcastle-on-Tyne.

OXFORD UNION SOCIETY.

Dr. WILLIAMS' LIBRARY, Gordon Square, W.C. 1.

(July 26th, 1921.)



# The Aristotelian Society.

## Proceedings, Volume XXI.

The Volume is now ready for publication, and the sheets to complete it, with cloth case for binding, are enclosed. The price of the published Volume is **25/-** net, but Members of the Society are entitled to purchase a copy at half-price (**12/6** net). Messrs. Harrison & Sons, Ltd., will bind the Volume for Members who return their sheets and cloth case in the enclosed envelope for 4/-, postage 1/- extra. Members who wish to retain the unbound sheets and also have a copy of the bound Volume can return the cloth case, and will be allowed a further reduction of **2/6** in the price of the bound Volume.

Any Member who would prefer to receive the annual Volume *instead of* the papers issued before the Meetings, is requested to inform the Hon. Secretary before the beginning of the Session.

(See over)

## **Arrangements for the next Session.**

---

The Inaugural Meeting of the Forty-Third Session will take place at 21, Gower Street, W.C. 1, on Monday, October 10th, 1921, at 8 p.m., when Dr. F. C. S. SCHILLER will deliver the Presidential Address on "Novelty."

There will be a Joint Session with the Société Française de Philosophie, in Paris, on December 27-31, 1921.

There will be a Joint Session with the Mind Association and other Societies, in Manchester, on July 14-16, 1922.

# Aristotelian Society.

## Proceedings, Volume XXI.

To MESSRS. HARRISON & SONS, LTD.,  
44-47, ST. MARTIN'S LANE,  
LONDON, W.C. 2.

Dear Sirs,

Enclosed I send you

1. The sheets and cloth case to be bound, and 4/- for cost of binding. Postage 1/- extra.
2. A.....for 12/6 for a copy of the bound Volume, which I am entitled to purchase at half-price. Postage 1/- extra.
3. A.....for 10/- and the cloth case for binding, in exchange for a copy of the bound Volume. Postage 1/- extra.

I am,

Yours faithfully,

Name .....

Address .....



# The Aristotelian Society.

**Alterations in the announcements for the Meetings  
on March 7th and June 6th, 1921.**

**MARCH 7TH--"Cosmic Evolution." Professor J. E.  
BOODIN.**

**JUNE 6TH--"The Structure of Scientific Inquiry."  
Miss DOROTHY WRINCH.**

The Paper by Dr. F. W. THOMAS, announced for  
June 6th, is postponed till next Session.



# The Aristotelian Society.

TO THE MEMBERS OF THE

ARISTOTELIAN SOCIETY.

The following announcement of the preliminary arrangements for the Special Session of the Société Française de Philosophie, in which the Aristotelian Society is invited to participate, has been received.

H. WILDON CARR,

*Honorary Secretary,*

107, Church Street, Chelsea, S.W. 3



La Société Française de Philosophie, accomplissant la promesse qu'elle avait faite au meeting tenu l'an passé à Oxford, a décidé de convier à une session extraordinaire les sociétés philosophiques anglaises, américaines et italiennes. Cette session aura lieu à Paris, du 27 au 31 Décembre, 1921. La Société française de philosophie compte organiser, pour cette réunion, une série des séances analogues à celles qu'elle tient habituellement où des *thèses*, préalablement envoyés aux membres de la Société, sont exposés par les rapporteurs et soumis à la discussion.

Les travaux de la session seront répartis entre quatre Sections :

- I. Logique et Philosophie des Sciences.
- II. Métaphysique et Psychologie.
- III. Histoire de la Philosophie.
- IV. Morale et Sociologie.

Le Président d'honneur est M. E. Boutroux, de l'Académie Française, qui ouvrira la Session.

Les Présidents de chacune des sections chargées d'organiser les séances sont respectivement M. M. P. Painlevé, membre de l'Institut, Ancien Président du Conseil des Ministres, H. Bergson, de l'Académie Française, L. Lévy-Bruhl, membre de l'Institut, professeur à la Sorbonne, C. Bouglé, professeur à la Sorbonne, Directeur du Cercle d'Etudes Sociales.

Chaque section comportera 8 Séances de communications et de discussions, chacune, à tour de rôle, siègera une fois en assemblée générale.

Afin de fixer aux Sociétés participantes une direction susceptible d'orienter les communications de leurs délégués, le bureau de la Société Française de Philosophie a cru devoir leur proposer dans chaque section deux sujets centraux.

Ces sujets sont pour la Section I.

- a. Nature et fonctions du concept.
- b. Soit, Les axiomes du calcul de probabilités, soit, Les formes les plus récentes de la théorie de la relativité.

Pour la Section II.

- a. De la nature de la Vérité.
- b. Le fonctionnement de l'intelligence.

Pour la Section III.

- a. Socratismes et Platonismes.
- b. Les rapports de la philosophie avec les sciences physiques et biologiques depuis le commencement du XVIII<sup>e</sup> siècle.

Enfin pour la Section IV.

- a. La philosophie des valeurs et la vie morale.
- b. La notion de l'État et les expériences contemporaines.

Ces divers sujets ne sont d'ailleurs que d'indications très générales et les délégués des Sociétés auront toute latitude pour fixer d'une manière précise le sujet qu'ils auront arrêté.

La Société française de philosophie souhaite que dans chaque section et pour chaque ordre de sujets, il y ait un représentant de chacune des nations participantes.

Elle serait donc particulièrement reconnaissante aux Associations invitées de bien vouloir lui désigner les huit délégués susceptibles de venir à la session et le titre exact de la *thèse* que chacun d'eux compte soumettre à la discussion.

Pour la bonne marche des séances il faudrait que les délégués puissent envoyer, dans le mois d'Octobre prochain le résumé de leur *thèse* (environ deux à trois pages d'impression du 2145 lettres au maximum) pour être adressé aux différents membres devant prendre part à la discussion.

Il est bien entendu que si le nombre des délégués qui doivent présenter des *thèses* se trouve nécessairement limité, le nombre des invités susceptibles de prendre part à la discussion ne l'est pas.

Prière d'adresser les réponses et communications à M. Xavier Léon, Administrateur de la Société Française de Philosophie, 39, Rue des Mathurins, Paris 8, qui les transmettra aux présidents des sections



# The Aristotelian Society.

21, GOWER STREET, W.C. 1.

The Annual Meeting to receive the Report of the Executive Committee and the Treasurer's Financial Statement for the present Session and to elect the Officers and Executive Committee for the ensuing Session will be held at 21, Gower Street, W.C. 1, on Monday, July 4th, 1921, at 8 p.m.

In accordance with Rule VII., the Executive Committee nominate as Officers for the ensuing Session :—

*President* - - Dr. F. C. S. SCHILLER.

*Treasurer* - - Professor T. PERCY NUNN.

*Librarian* - - Miss L. S. STEBBING.

*Hon. Secretary* }  
*and Editor* } Professor H. WILDON CARR.

The nominations will be submitted to the Meeting for approval.

In accordance with Rule VIII., a ballot will be held for the election of six Members to constitute, with the Officers, the Executive Committee. A balloting paper is enclosed herewith.

H. WILDON CARR,

June 27th, 1921.

*Honorary Secretary.*





# ARISTOTELIAN SOCIETY.

## FINANCIAL STATEMENT—42ND SESSION, 1920-1921.

### 1. Ordinary Account.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Balance at beginning of Session .. .. .	89	13	10	Rent .. .. .	20	14	6
Members' subscriptions—	£	s.	d.	Harrison's, for printing, binding, etc.—	£	s.	d.
Current Session .. .. .	177	9	0	For 41st Session .. .. .	201	0	11
Arrears .. .. .	37	16	0	For Current Session .. .. .	293	5	3
In advance .. .. .	4	4	0				
	219	9	0	To diminution of Loan .. .. .	50	0	0
Sales of Publications—				Advertisements .. .. .	9	2	8
Williams and Norgate—				Income-tax .. .. .	0	6	11
July to December, 1919 .. .. .	121	15	7	Cheque-book and losses on cheques .. .. .	0	5	11
January to June, 1920 .. .. .	50	14	9	Treasurer's postage and stationery .. .. .	1	4	3
June to December, 1920 .. .. .	109	15	10	Balance in hand at end of Session .. .. .	61	2	1
	282	6	2				
Other Sales .. .. .	21	7	0				
	303	13	2				
Share of Surplus from Oxford Congress .. .. .	24	6	6				
	£327	2	6		£327	2	6

### 2. Travelling Expenses Account.

	£	s.	d.		£	s.	d.
Balance at beginning of Session .. .. .	32	15	0	Balance at end of Session .. .. .	32	15	0
	£32	15	0		£32	15	0

### 3. Loan Account.

	£	s.	d.		£	s.	d.
Amount outstanding at beginning of Session .. .. .	116	19	4	Amount repaid this Session .. .. .	50	0	0
	£116	19	4	Amount outstanding at end of Session .. .. .	66	19	4
					£116	19	4

Examined and found correct, June 30th, 1921.—

(Signed)

T. PERCY NUNN, *Treasurer*.

(Signed)

GILES F. GOLDSBROUGH } *Auditors*  
G. R. S. MEAD }

*Note by Treasurer.*—At the end of last Session the Society owed to its printer £201 0s. 11d., and to Professor Carr £116 19s. 4d. On the other hand, £121 15s. 7d. was due to the Society on account of sales of publications to December, 1919, and there was a balance at the bank of £89 13s. 10d. Thus, assuming the payment of the sum due for sales, the Society was £106 10s. 10d. in debt. At the end of the present Session the debt to the printer has been entirely wiped out, and the debt to Professor Carr reduced to the Ordinary Account, it appears that the adverse balance of £106 10s. 10d. at the beginning of the Session has been reduced to one of £5 17s. 3d. at the end. This estimate does not take account of sales which have taken place since December, 1920, nor of expenses incurred after June 30th, 1921.



















106/ARI



111929

